How Trust in the Food System and in Brands Builds Consumer Confidence in Credence Attributes: A Structural Equation Model

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ABSTRACT

Given the credence nature of food quality and food safety attributes, consumers cannot easily verify whether food is high quality or is safe to eat, thus they rely on abstract systems of regulation and quality signals such as brands to make informed consumption choices. In fact, trust is recognized as a rational strategy that reduces consumers' uncertainty when purchasing goods with credence attributes. While trust in food is a topical issue in an era of increasingly complex food systems, how trust and more precisely brand trust affects consumers' perceptions of food is a relatively new research area in food economics.

This thesis aims to answer questions such as what drives trust in the actors within the Canadian food system (i.e. government, farmers, food manufacturers, and food retailers) and in food brands, and the relationship between that trust and consumer confidence in food quality and food safety. Previous studies on institutional and system trust have been carried out primarily in the sociology, marketing and political sciences disciplines, while a few studies in food economics have investigated the influence of institutional trust and reported the degree of public trust in market actors. This study extends previous research on consumer trust in the context of food by developing a conceptual model in which trust in the food system and brand trust are expected to evolve to public confidence in credence attributes and lead to consumer commitment to food brands.

Inspired from a comprehensive synthesis of the literature on consumer trust, the theoretical background suggests that consumer confidence in food attributes is jointly determined by trust in the food system (system-based trust) and brand trust (product-based trust), and it is moderated by consumer characteristics (personal-based trust) – namely: risk, past consumption experience and ethically-motivated behaviour. As well, consumers are assumed to perceive an actor or a brand as trustworthy through the influence of four postulated dimensions of trust: perceived competence, credibility, benevolence and reputation.

A Structural Equation Modelling (SEM) approach is used for the empirical analysis. Data were gathered through an online survey of consumers conducted across Canada in July 2012 focusing on fresh chicken and packaged green salad products. The results show that individually none of the postulated antecedents of trust (i.e. competence, credibility, benevolence and

reputation) was a significant driver for trust, especially for packaged salad. Unlike previous research on institutional trust and brand trust that uses a number of separate dimensions to measure trust predominantly in non-food contexts, this thesis finds that trust in the food system and food products could be measured differently by taking into account the interactive effects of perceived competence, credibility, reputation and benevolence on public trust. As such, the findings suggest that Canadian consumers tend to trust brands of chicken and packaged salad when these products are perceived as high quality, are backed by credible information, have a good reputation and, at the same time, enhance consumers' welfare. In fact, a brand cannot be perceived as high quality and safe to eat (brand competence) without containing transparent information signalling its quality and safety (brand credibility).

Additionally, results reveal some apparent product-specific effects: brand trust matters in fostering consumer confidence in chicken but not for salad. Furthermore, trust in the food system as a whole appears to be more influential in leading to public confidence in credence attributes than trust in food brands in the case of chicken. As such, it appears that trust in actors within the food supply chain is more important than relying on individual products. As well, the analysis shows that while psychographic variables (risk aversion, past consumption experience) and some demographics (e.g. gender, education) moderate the relationship between trust in the food system and brands for chicken, this is not the case for salad.

In terms of marketing implications, the results suggest that while brands are useful signalling mechanisms, trust in these brands is not the main driver for consumer confidence in credence attributes. Furthermore, the much stronger effect of system trust implies that decision-makers would benefit by investing in building trust relationships with the public. Transparent communication and credible assurances about the practices and the intentions within the food system could be a way to gain and maintain public trust and, ultimately, consumer confidence in food quality and food safety.

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Chapter 1 – Introduction

1.1 Problem Statement

The extent to which consumers trust the food system, and in particular, how food brands affect confidence in quality attributes remains an open question. While consumers are increasingly demanding safer and healthier food, they cannot easily assess these attributes due to their credence nature. The economics of information theory categorized attributes into three dimensions: search, experience and credence attributes (Nelson, 1970; Darby and Karni, 1973). Search attributes can be evaluated prior to purchase (e.g. price, colour, and brand) whereas experience attributes are verified after consuming the product (e.g. taste, flavour, and texture). However, credence attributes (e.g. health attributes, food safety standards, animal welfare standards, origin, environmental footprint, etc.) are difficult to determine at the time of purchase and even after consumption. Information asymmetry (i.e. consumers are not fully informed about the product quality) is prevalent in markets for credence qualities, and typical examples of credence food attributes are vertically differentiated products, for example, whether salad has been produced organically, whether tuna has been caught with dolphin-friendly methods, or whether crops have been produced with a biofuel production technology. Consumers face greater uncertainty with respect to credence attributes than experience attributes. Related to this, Anderson (1994) claims that previous consumption experience is a reliable source of knowledge for experience attributes but is less useful in the case of credence attributes. As credence attributes are not verifiable from the product alone, consumers' perceptions of credence characteristics are informed by quality signalling cues. Thus, confidence in credence attributes is a matter of consumer trust in abstract systems of regulation and codes of practice as well as in quality signals such as brands (Caswell and Mojduszka, 1996; Yee and Yeung, 2002; Berg et al. 2005; Drescher et al., 2011). As such, there is a need for consumers to rely on market actors to supply safe food that also meets their quality expectations.

Trust has been recognized as having a crucial role in consumer purchasing decisions and product loyalty, however, only recently has more attention been given to the notion of trust in the relationship between the firm and the consumer. Most of the empirical studies on the evaluations of trust are business to business in nature (Yee and Yeung, 2010). Indeed, there is a vast

literature dealing with institutional and organizational trust within a business-to-business frame, including contributions from psychology, sociology, economics, marketing and management.

From a food economics perspective, recent empirical research (e.g., Yee, Yeung and Morris, 2005; Dierks and Hanf, 2006, De Jonge et al., 2008a; 2008b; Innes, 2008; Romanowska, 2009, Uzea, Hobbs and Zhang, 2011; Grebitus, Steiner and Veeman, 2012) has investigated the concept of consumer trust in quality signals as well as trust in different sources of information. For instance, Yee and Yeung (2010) study the factors that build consumer trust in British livestock farmers regarding food safety and whether consumer trust positively affects purchase likelihood for meat. Ding, Veeman and Adamowicz (2011) examine the influence of generalized trust on consumer reactions to a series of three *Bovine spongiform encephalopathy* (BSE) events in Canada in 2003 and 2005. Results show that Canadian households who do not trust the information sources are more sensitive to food risks than those who trust. Similarly, Innes (2008) and Uzea, Hobbs and Zhang (2011) examine Canadian consumer trust toward different organizations (government, industry, independent third parties) for quality assurance in terms of environmental sustainability and animal welfare, respectively. Both studies find that although trust varies across these organizations, government garners the most trust in terms of verification and knowledge of standards. This finding is also supported by Romanowska (2009) who emphasize the leading role of public authorities in assuring product quality in the Canadian food market and its importance in enhancing consumer trust. While these studies found significant heterogeneity among Canadian consumers with respect to trust in different food actors in isolation, public trust in the food system as a whole remains unclear and appears to be worthy of investigation in the context of the food system-consumer relationship.

In addition to trust in the food system, consumers also rely on quality signals, such as brands, to form expectations about the product's performance. With the globalization of the agri-food industry, increasing competitive pressures for food manufacturers and retailers have led them to seek new product differentiation strategies. Branding of food products is moving beyond processed, packaged foods to include branding of generic 'raw' agricultural commodities (e.g., salad, vegetables, meat). At the same time, retailer-owned private labels have grown in importance. In addition to competing with national brands for shelf space, private label brands have shifted from generic staples to premium products (AAFC, 2010). While some studies (e.g.,

Innes, 2008; Uzea, Hobbs and Zhang, 2011) recognize the role of quality signals such as brands in shaping consumer preferences and purchasing behaviour, brand trust is a relatively under-researched aspect of food economics. Thus, this thesis explores how brand trust influences consumer confidence in credence attributes and how it affects brand loyalty. Unlike the marketing perspective that legitimises the brand as a partner and personifies it (e.g., Fournier, 1998), this paper draws upon signaling theory from the Economics of Information literature in recognizing the informational aspects of a brand as a quality cue. A brand is a quality signal on which consumers may rely to form expectations about food quality and food safety.

To address this apparent void in the literature, this thesis focuses on how trust in the food system and in brands contributes to consumer confidence in credence qualities. In addition to the considerable amount of attention given to institutional trust, a number of researchers have examined trust in the context of food safety and risk perceptions (e.g., Peters, Covello and McCallum, 1997; Mazzocchi, Lobb and Traill, 2004a; De Jonge et al., 2004, 2007, 2008a, 2008b; Berg et al., 2005; Dierks, 2005; Yee, Yeung and Morris, 2005; Schroeder et al., 2007; Chen, 2008; Saghaian and Shepherd, 2009; Ding, Veeman and Adamowicz, 2011). It is evident that food crises contribute to the erosion of consumer confidence in food safety. Indeed, the literature suggests an inverse relationship between trust and perceived risk (Siegrist, Cvetkovich and Roth, 2000; Eiser, Miles and Frewer, 2002). However, consumer confidence in credence attributes is not only limited to food safety. In fact, "there is evidence that consumers are concerned about production-related aspects of meat beyond specific food safety incidents" (Drescher et al., 2011: 3). As such, this research looks at trust from a broader dimension that includes other quality attributes of which food safety is a component. Therefore, branding as a signal of quality is also examined in combination with trust in the food system.

The research premise here is that consumer trust (related to values and intentions) in the food system and in brands may evolve to confidence (related to performance) resulting from positive experiences and ongoing satisfaction and lead to consumer loyalty. By combining the effect of trust in the food system and the influence of brand trust on consumer confidence, this thesis endeavours to contribute to the understanding of public confidence in credence qualities from a food economics perspective.

1.2 Background

The new era of food product attributes includes quality, safety and lifestyle objectives. While quality and safety are not new concepts, concerns about them have been growing with the development of globally integrated supply chains and the occurrence of a number of food scares during the last couple of decades. These factors have contributed to the emergence of trust, and symmetrically, mistrust as pressing issues in food markets and highlight different dimensions of trust in food safety, nutrition, quality, economic value, environmental and animal welfare. These ethical preferences regarding how food should be produced, "which may or may not be related to product quality and safety and may be more a matter of perception than of science" fall under the rubric of lifestyle standards such as eco-friendly and organic lifestyles (Knutson and Josling, 2009: 6). In fact, many consumers today are not only seeking high quality and healthy food, but they may also care if the product has been produced and processed in a socially and environmentally responsible manner. The lifestyle standards involving animal welfare, local sourcing, organic farming, and fair trade, unlike safety, are more cognitively-based rather than scientifically-based. In other words, a consumer's decision-making process involves emotions and psychological constructs (e.g., trust) to form expectations about product performance. Thus, researchers often model trust as a potential cause in choice scenarios framed around social dilemmas (Rousseau et al., 1998). On the other hand, research has demonstrated that perceptions of risk are socially constructed (Frewer, 2000). Indeed, risk, like trust, tends to be psychologically determined by public opinion and responses to a particular threat which are based more on emotions rather than calculative risk assessments. While trust is seen as one prerequisite for effective risk communication (e.g., Kasperson, Golding and Tuler, 1992), mistrust (i.e. lack of trust) tends to occur particularly when the market is perceived as failing to provide an efficient level of food safety, thereby compromising public health.

In this context, economic theory and empirical evidence suggest that food scandals cause a demand shock and contribute to lower consumer demand in the short run (Saghaian and Shepherd, 2009). For instance, it has been admitted that the BSE crisis of the early 1990s in the UK reduced consumption of beef in UK at least in the short-run (Burton and Young, 1996). In Japan, structural changes in meat consumption were noticed (Jin and Koo, 2003; Peterson and Chen, 2005) following the first BSE event in 2001 when meat consumption decreased by 70% in

the short run. In North America, the duration of the impacts of BSE on U.S. beef demand was estimated to be about a couple of weeks (Kuchler and Tegene, 2006) between 1998 and 2004 and less than four months in Canada during BSE incidents in 2002 and 2005 (Ding, Veeman and Adamowicz, 2011). The recent scandal in Europe in February 2013 regarding unlabelled substitution of horsemeat in processed beef products appeared to have weakened British consumers trust in the implicated brands, at least initially. A month after the scandal, a survey revealed that 7 in 10 consumers felt confident when buying products in the supermarket compared to 9 in 10 before the incident (Which, 2013). In the case of the 2012 XL Foods E. coli outbreak in Canada, hundreds of tonnes of recalled beef were dumped to protect consumers from contamination. Another recent salmonella outbreak linked to *Foster Farms* brand of raw chicken sickened nearly 300 U.S. consumers in October 2013.

The fresh produce market is another industry that has suffered a number of food-borne pathogens over the last two decades, with the largest ever E. coli outbreak in radish sprouts in Japan in 1996 (ISS, 1996) followed by a widespread recall of bagged spinach in 2008 in US. In June 2011, a European E. coli O104:H4 outbreak initially blamed on Spanish cucumbers, but later traced to beansprouts from Germany, led to numerous cases of illnesses and several deaths. During the outbreak, produce trade in the region was disrupted and consumers' confidence further weakened after numerous incorrect statements from officials regarding the supposed source of the outbreak (Prevor, 2011). These facts related to meat and fresh produce illustrate the negative effects of food safety incidents on public trust and confidence.

In conjunction with these developments, and in response to consumer demand for high quality credence attributes, different food supply chain stakeholders have adopted multiple mechanisms to communicate credence attributes to consumers. These include quality assurance programs, labelling requirements, third party certification, advertising and branding. While labels and certification usually communicate one attribute (e.g., certified gluten-free, cage-free eggs), brands can signal more than one attribute. Furthermore, brands are becoming more common for unprocessed food products such as meat and fresh produce. For instance, organic food products are expected to be produced without the use of fertilizers, chemical sprays and additives. However, consumers cannot easy evaluate these attributes, which indicates a need for special quality signaling systems. That is, consumers are likely to use the brand name as a proxy for the

quality standards and the safety guarantee in purchasing food products with credence attributes. As such, brands are expected to serve as a vehicle to increase credibility of the credence attributes. Unlike certification systems, which usually signal a collective reputation for a set of products within an industry (e.g. organic), brands are proprietary quality signals linked to a specific firm. Until recently, branding in food markets largely applied to further processed products, with branding of unprocessed products (meat, fresh produce, etc.) being less common. This may have been due to the challenges in differentiating an unprocessed commodity or in achieving consistent quality. An extension of branding and brand quality signals into unprocessed food product categories is a relatively recent trend. This may reflect a recognition that consumers are interested in both experience and credence quality attributes when purchasing meat, fresh produce or other unprocessed good products, and that a firm can signal these attributes through building a strong brand reputation.

Firms have been developing their own codes of practice (private standards) and branding strategies to differentiate their products from their competitors' products since brands act as quality signals to alleviate the informational problem. With investments in brand capital, firms have a stronger incentive to maintain product quality and safety to avoid damage to brand reputation and to build consumer trust and loyalty. In this thesis, firms are taken to represent the 'food industry' (food processors and food retailers); the food industry forms an important player in the 'food system' as conceptualized in this thesis. Trust in these players is expected to affect consumer confidence in credence attributes. On the other hand, trust in brands is another factor that predicts consumer confidence. While consumers may not have direct contact with the food manufacturers responsible for guaranteeing food quality and food safety, brands are accessible extrinsic quality cues for consumers in the shopping environment.

The signals (i.e. brands) sent by retailers or manufacturers may not lead automatically to greater consumer trust because part of that trust emanates from the consumers themselves. Accordingly, it is posited that consumer confidence in food originates from three sources: the food system, food products and brands, and personal traits. The premise here is that trust derives from the shadow of the future; therefore, it requires long-term interaction (repeated purchases). Thus, trust in food is a dynamic process by which past positive interactions lead to increased trust in the future (Berg, 2004; Möllering, 2001). Cumulative good consumption experiences

help to build confidence in quality-differentiated products. In this context, McCluskey (2000) shows in the case of organic food, a repeat-purchase relationship, coupled with third party monitoring is required for high-quality credence goods to be available.

In this regard, this thesis attempts to provide a comprehensive examination of the factors that affect consumer confidence in credence qualities originating from three different entities: the food system, food products (brand trust) and consumers' characteristics. Unlike much previous research, this thesis examines trust in the context of the course of normal consumption rather than in response to a food safety incident. Furthermore, rather than being limited to a specific type of food such as organic or genetically modified (GM) products, the thesis deals with trust in the broader context of conventional food. Chicken and green salad products are used as examples to explore the research questions posed in this thesis.

1.3 Aim and Objectives

The thesis seeks to explore the link between consumers' overall confidence in credence attributes, consumer trust in the food system, and brand trust; and how these affect consumer repurchase intentions and brand loyalty. This goal is accomplished through the following objectives:

- identify the factors which contribute to Canadian consumers' trust in the food system regarding food safety and quality attributes,
- identify how trust in a brand builds consumer confidence in credence attributes,
- determine to what extent individual characteristics affect consumer confidence in relation to other determinants, and
- determine the influence of each of these factors in shaping consumer confidence, repurchase intentions, and brand loyalty.

Achieving these objectives requires at the outset an understanding of the domain of trust. Thus, a comprehensive literature review around the concept of institutional trust (i.e. trust in the food system) and brand trust and their dimensionality is conducted. A Structural Equation Modelling (SEM) approach is adopted to develop a conceptual model for consumer confidence

that links the causal factors of trust in the food system and brand trust. To my knowledge, this is the first attempt to combine both concepts of institutional trust and brand trust in an application to confidence in credence attributes from a food economics perspective. In addition to assessing simultaneously a set of relationships, multivariate techniques offer the opportunity of analyzing the role of consumers' beliefs and attitudes as mediators and consumers' characteristics as moderators. Furthermore, this thesis sets out to provide empirical evidence on the effect of the dimensions of trust on consumer buying decisions applied to fresh chicken meat and packaged green salad.

By doing so, this thesis sheds new light on the trust literature by bringing a meaningful contribution to consumer trust and the role of brand trust in the marketing of agricultural and food products. The assessment of trust from the consumers' perspective provides insights into how consumer trust is built, and may assist actors in the food supply chain in developing effective communication strategies to address public trust concerns around food quality and food safety.

1.4 Thesis Structure

The thesis is comprised of seven chapters. Drawing upon relevant social sciences and business literature, the postulated drivers and outcomes of public confidence in food are reviewed and discussed in Chapter 2. A set of hypotheses mapping the key expected relationships between brand trust, consumer confidence, trust in the food system, repurchase intentions and brand loyalty are developed. In Chapter 3, the postulated relationships are used to formalize the constructs of trust and confidence in a conceptual model. A Structural Equation Modelling (SEM) framework applied to consumer confidence in credence attributes is proposed. The process of data collection is described in Chapter 4 along with a descriptive analysis of the survey data. An online survey-tool was applied to a national sample of Canadians to elicit the measurement items of all constructs used in the SEM. In Chapter 5, the reliability of the measures is assessed, and the results on the statistical significance of the hypotheses are reported in Chapter 6. Finally, the findings are summarized in Chapter 7, and implications of the analysis for different stakeholders are discusses along with recommendations for future research.

Chapter 2 - The Concept of Trust and the Determinants of Consumer Confidence in Credence Attributes

This chapter is a literature-based review of the concept of trust. It draws upon a thorough review of relevant social sciences and business literature in order to integrate the differing views of trust across myriad disciplines. The objective is to generate a series of trust antecedents and measurement items to inform the subsequent conceptual model. The chapter includes seven sections. After an introduction, section 2.2 defines the construct of trust from the perspective of various disciplines. Section 2.3 describes the conditions under which trust emerges. Section 2.4 examines the similarities and differences between the concepts of trust and confidence. Section 2.5 discusses the postulated determinants of consumer confidence in credence attributes, namely: (*i*) system-based trust, (*ii*) product-based trust, (*iii*) and personal-based trust. Section 2.6 discusses the outcomes of public trust and confidence. Finally, section 2.7 concludes the chapter.

2.1 Introduction

Trust has been acknowledged as a significant ingredient for social interactions as well as for a competitive market advantage. Consumer confidence reduces perceived risk and facilitates a favourable consumer response (i.e. purchase). Furthermore, trust facilitates strategic collaboration (Dodgeson, 1993; Zucker et al., 1996) as well as conflict resolution (Parks, Henager and Scamahorn, 1996; Moore, 1998; Lewicki and Tomlinson, 2003).

At present, "we know much better what trust does than what trust is" (Castaldo, Premazzi and Zerbinim, 2010: 657). Indeed, trust has tended to be a ubiquitous concept with no standard or unique definition: its meaning varies widely in accordance with the application, thus, it has a versatile nature. Moreover, the existing definitions of trust are puzzling: some theories consider the construct as behaviour or a cooperative conduct (e.g., Deutsch, 1962; Coleman, 1990; Currall and Judge, 1995), whereas many others refer to it as a psychological event or an attitude (e.g., Rousseau et al., 1998; Romano, 2003). Psychologists tend to view trust as an individual characteristic or as behavioural expectations of others involved in transactions. Economists and sociologists tend to focus on how institutions and organizations are established and how

incentives are used to reduce the uncertainty associated with transactions among relative strangers (Kim, Prabhakar and Park, 2009).

In addition, the term "trust" has often been associated with concepts such as loyalty (e.g., Rich, 1997), risk-taking (e.g., Sheppard and Sherman, 1998), confidence (McAllister, 1995), and cooperation (e.g., Burt and Knez, 1995). Therefore, the construct is often applied inconsistently in reference to various concepts, making it difficult for scholars to decide what trust is and when it occurs (Clark and Payne, 1997). Ultimately, there is no commonly accepted evaluation approach or benchmark that allows for a comparison of the different trust modelling frameworks under a set of common circumstances. The next section presents a number of definitions of trust drawn from different disciplines.

2.2 Definitions of Trust

In their conceptual analysis of trust and mistrust, McKnight and Chervany (2001) found sixty-five definitions of trust in the literature: twenty-three from psychology, twenty-three from management and communications, and nineteen spread across sociology, economics and political science. Although the business and social science literatures agree that trust is a relationship of reliance, scholars continue to express concern regarding their collective lack of consensus about the meaning of trust. While some find it a fuzzy concept, others consider it as an elusive construct, as stated by Oliver Williamson (1993: 453) "trust is a term with many meanings" or by Harrison White (1992: 174) "trust is itself a term for a clustering of perceptions". Since trust is not necessarily reflected in behaviour, most researchers have conceptualized it as an attitude, distinct from behaviour. As such, individuals characterize the experience of trust in terms of their thoughts, feelings, and behavioural intentions. In other words, behaviour is an outcome of trust.

In psychology, trust is regarded as a reasonable expectation that the trustee will behave in a beneficial way to the trustor. According to Kee and Knox (1970), trust is a subjective phenomenon defined by the psychological experiences of the individual who bestows it. Gambetta (1988) explains trust as the subjective probability by which an individual, A, expects that another individual, B, performs a given action on which his or her welfare depends. Likewise, Mayer, Davis and Schoorman (1995; 712) describe trust as "the willingness of a party to be vulnerable to the actions of another party, based on the expectation that the trustee will

perform a particular action important to the trustor, irrespective of the ability of the latter to monitor or control such an activity".

While in psychology the degree to which one party trusts another is a measure of belief in the honesty, fairness, or benevolence of the other party; in economics trust is often conceptualized as reliability in transactions. Economists tend to view trust as either calculative based on past behaviour and experience (Williamson, 1993) or institutional with respect to the rules governing a society (North, 1990). The economics literature suggests that trust primarily involves a calculative process whereby one party calculates the cost/benefit of the partner cheating in an exchange (Williamson, 1993; Dasgupta, 1988). For instance, consumers may trust farmers when the benefit of cheating does not exceed the cost of being caught, otherwise farmers would suffer losses (Yee and Yeung, 2002). Furthermore, much of the economics literature focuses on both generalized trust and institutional trust (e.g., Ding, Veeman and Adamowicz, 2011).

Generalized (or extended) trust refers to the idea that most people can be trusted. Referring to Uslander (2008), generalized or as he calls it, moralized trust (altruistic trust for Mansbridge (1999)), is the faith in people we do not know and it does not depend upon our life experiences. Yet, "trust in strangers is largely based upon an optimistic view of the world" where it is believed that people share fundamental moral values (Uslander, 2008: 4).

On the other hand, strategic trust is having confidence in people we know and this depends on our experience (Uslander, 2008). Scholars like Luhman (1979, 1988), Seligman (1997) and Kjærnes, Harvey and Warde (2007) characterize institutional trust as confidence in institutions and organizations. Psychologists assess (generalized) trust in terms of personal attributes and internal cognitions of trustors and trustees (Deutsch, 1962; Rotter, 1967), whereas sociologists treat trust as a property of relationships among people (Granovetter, 1985) or institutions (Zucker, 1986).

Like psychologists and economists who define trust differently according to their disciplinary perspectives, there is no agreement on a suitable definition of trust in marketing thought and practice. For instance, while Moorman, Deshpandé and Zaltman (1993: 82) define trust as: "A willingness to rely on an exchange partner in whom one has confidence", Morgan

and Hunt (1994: 23) describe trust as "the perception of confidence in the exchange partner's reliability and integrity". Albeit there is a difference in both definitions, they refer to trust as an expectation about the expertise and reliability of an exchange partner. A large body of work in marketing has examined the issue of trust, focusing on the role of trust in the relationship between dyadic partners involved in transactions (e.g., Doney and Cannon, 1997; Smith and Barclay, 1997).

The meaning of trust across different disciplines is expressed in different words. Trust is associated with reliability, confidence, positive attitude and expectations. Rousseau and his colleagues combine those concepts into one definition that has reached widespread acceptance: "Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another" (Rousseau et al., 1998: 395). Two relatively recent definitions provide a more comprehensive description of the construct of trust. First, Romano (2003: 33) describes trust as "a subjective assessment of another's influence in terms of the extent of one's perception about the quality and significance of another's impact over one's outcomes in a given situation, such that one's expectation of, openness to, and inclination toward such influence provide a sense of control over the potential outcomes of the situation". Second, Adams and Webb (2003: 38) present trust as "a psychological state involving positive confident expectations and willingness to act on the basis of these expectations". Additionally, the authors argue that trust expectations are created primarily by the interaction of the perceived qualities of the trustee and contextual factors in play when trust decisions are made (Adams and Webb, 2003). This clearly underlines the conditions under which trust emerges: interdependency and risk. While interdependency is based on positive expectations of, or confidence in, the trustworthiness of another party (Rousseau et al., 1998), risk is the potential that the trusting party will experience negative outcomes (e.g., loss) if the other party proves unreliable (March and Shapira, 1987; Sitkin and Pablo, 1992). Thus, the exposure to risk creates an opportunity to build trust (Rousseau et al., 1998). The two conditions of trust - risk and interdependence - are further examined in the next section.

2.3 The Conditions of Trust

From the review of social science literature, scholars agree that trust emerges under a couple of conditions: risk and interdependence.

2.3.1 Risk

Since we often encounter situations in which we cannot compel the cooperation we look for, trust remains a risky undertaking (Luhmann, 1988; Lewicki and Tomlinson, 2003). Thus, Mayer, Davis and Schoorman (1995) affirm that trust is the trustor's willingness to engage in risky behaviour that stems from the trustor's vulnerability to the trustee's behaviour. This vulnerability arises in situations of informational problems (i.e. asymmetric information) that lead the consumer to take a risk. Referring to James (2002), trust pertains to circumstances in which agents take risky actions in environments characterized by uncertainty or informational incompleteness. As such, trust is not needed in a riskless situation with complete information or certainty (Lewis and Weigert, 1985; Dierks, 2005). Indeed, "without vulnerability, trust is unnecessary because outcomes are inconsequential for the trustor" (Moorman, Deshpandé and Zaltman, 1993: 82). In interpersonal social relationships when a person trusts someone, there is some acceptance that this trust might be broken at a future time. Thus, if individuals try to hedge or insure themselves against possible disappointment, then there is no trust (Seligman, 1997).

Risk represents an important determinant of food choices which might be related to hygiene, health, safety and even to technology acceptance. Perceived risk has become increasingly salient in food products in the wake of food scares in recent years that have eroded public confidence in both private and public institutions. Indeed, when a food safety hazard emerges, consumers tend to change their behaviour. In their study on food safety risks in fresh produce, De Vocht et al. (2011) find that high susceptibility of a threat and low trust in government contribute to an increased fear, which in turn influences risk perceptions. On the other hand, when governmental trust is high, susceptibility to a threat appears to have no effect. Similarly, Dierks and Hanf (2006) find that under standard situations, trust has a marginal impact on the consumer's intention to purchase. However, when consumers are confronted with a hypothesised salmonella incident, trust turns out to be among the most decisive factors influencing the purchasing decision.

There is evidence on the causal relationship between risk and trust in the sense that a certain level of trust leads to risk taking (Rousseau et al., 1998). Thus, risk has been called the element "that gives the trust dilemma its basic character" (Johnson-George and Swap,

1982:1307) and most would agree that trust is "intimately associated with risk and risk taking" (Coleman, 1990) because trust and risk can be thought of as "mirror images" of each other (Das and Teng, 1998). For instance, researchers on technology acceptance found a negative association between the level of trust in actors and institutions perceived as responsible for a technology and the levels of perceived risk related to this technology (e.g., Earle and Cvetcovich, 1995; Siegrist, Cvetkovivh and Roth, 2000). More insights on risk are explored in section 2.5.3 in the context of the influence of personal characteristics.

2.3.2 Interdependence

Stephen Covey (1989) states that interdependence is a choice that only independent people can make (dependent people do not have the free choice to enter into an interdependent relationship), and the participants are generally able to produce more together than separately. As such, interdependence is the highest form of maturity, above dependence and independence, and can be defined as a mutual reliance between two or more cooperative autonomous parties (e.g., two or more firms). It implies that the interests of one party cannot be achieved without at least a partial reliance upon another party (Dierks, 2005). Distinctly, the concept differs from "dependence", which implies that each member of a relationship cannot function or survive apart from one another. Moreover, interdependence implies cooperation, sharing and openness to achieve mutual benefits, even though negative outcomes or risks are likely to occur. Indeed, when someone is reliable, that person is expected to act in a responsible manner or beneficial way that incentivizes others to collaborate with that individual. On the contrary, when someone appears to be suspicious, others refrain from cooperating since there is a lower level of probability that these collaborations will be successful (Gambetta, 1988).

McKnight and Chervany (2001) define this relation of mutual dependence as "trusting intentions" where one is willing to depend on another with a feeling of relative security since one party has no control or power over the other. The feeling of security means that "one feels safe, assured, and comfortable about the prospect of depending on another" (McKnight and Chervany, 2001: 34). However, this security is relative because people have different levels of confidence about their willingness to depend on each other. Hence, the degree of interdependence relies on

some factors, like the type of relationship between the actors and the potential benefits derived, which in turn impact the nature of risk and trust (Einwiller, 2003).

Interdependence can be more relevant in an interpersonal (person to person) or in inter-firm (B2B) context where trust is mutual and reciprocal. However, in the case of a consumer as an individual, there is no reciprocity since "the consumer must trust actors, but there is no requirement for the latter to trust the former" (Kjærnes, Harvey and Warde, 2007: 39). As such, public trust in institutions within the food system represents to some extent the willingness of consumers to recognize and accept the interdependencies of a complex social system (e.g., Cook, 2005). On the other hand, a consumer may not completely depend on a firm or its products in the sense that if he or she is not satisfied, he or she may switch to other similar products or brands since brands are essentially substitutes. Indeed, lack of trust may be reflected in intermittent reactions, like shifts in demand. For that reason, trust is considered as a criterion measure of consumer satisfaction (Chow and Holden, 1997; Swan, Bowers and Richardson, 1999).

Risk and interdependence are required conditions for trust. However, deviations in these conditions over the course of a relationship between parties can change both the level and, potentially, the form that trust can take (Rousseau et al., 1998). Seligman (1997) put forth that interdependencies and power relations are not necessarily symmetrical. For instance, in the business-consumer context "any market exchange between suppliers and consumers is characterized by asymmetries of power and information which invariably favour the former" (Kjærnes, Harvey and Warde, 2007: 31). The producer-/retailer-consumer relationship can be considered as a vertical relationship since the producer or retailer may exercise some influence over the consumer, through controlling the flow of information with respect to credence attributes, for instance. To circumvent the misuse of such power, institutional arrangements including various forms of standards, controls and sanctions serve to ensure reliable performance and protect rights.

2.4 Trust Versus Confidence

The Latin languages do not distinguish between the terms of trust and confidence, though other languages do (Kjærnes, Harvey and Warde, 2007*)*. For instance, both trust and confidence in French have the same translation (*confiance)*. Yet, the German proverb "*Vertrauen ist gut,*

Sicherheit noch besser" meaning "trust is good, confidence is better" indicates that trust and confidence may not be exactly the same (Seligman, 1997). While social scientists frequently conceptually entangle both terms, some suggest that confidence and trust are two distinct constructs (e.g., Luhmann, 1979, 1988; Petrusic and Baranski, 2003; Adams, 2005) and should be treated as such. Key conceptual differences between confidence and trust include knowledge of the person, institution or product in question, the contextual factors in play, and the kind of judgement one is making.

Webster's Revised Unabridged Dictionary (1828) defines confidence as "a trusting, or reliance; an assurance of mind or firm belief in the integrity, stability or veracity of another, or in the truth and reality of a fact", and trust as "confidence; a reliance or resting of the mind on the integrity, veracity, justice, friendship or other sound principle of another person". It is evident from these two definitions that trust involves confidence and vice versa. Hence, both constructs are conceptually linked and depend on each other. In fact, a higher level of trust is associated with a higher level of general confidence (De Jonge et al., 2008b). To be able to trust someone presupposes confidence, or in Giddens' (1991) terms 'basic trust'. If nothing can be taken for granted, it is very difficult to trust others. Thus, lack of confidence or trust engenders feelings of uncertainty and anxiety.

While, the terms "confidence" and "trust" are relevant to contexts like judging people (including their attitudes, behaviours and values), objects and events, some theorists disagree that trust and confidence can be applied to the same contexts. For instance, Luhmann (1988, 1979) strictly distinguishes between trust in persons and confidence in institutions. In his own words: "Trust remains vital in interpersonal relations, but participation in functional systems like the economy or politics is no longer a matter of personal relations. It requires confidence, but not trust" (Luhmann, 1988: 102). Likewise, Ullmann-Margalit (2004) argues that one may rely on or have confidence in something and someone, yet, trust relates only to people.

While, trust and confidence involve positive expectations about future events, they emerge under completely reverse conditions (Luhmann, 1988; Rousseau et al., 1998; Adams, 2005). In the behavioural decision-making literature, confidence in judgment is typically based on the strength and credibility of the evidence (Griffin and Tversky, 2002). Muir (1994: 1915)

states that a person "who makes a prediction may associate a particular level of certainty, or confidence, with the prediction. Thus, confidence is a qualifier which is associated with a particular prediction; it is not synonymous with trust". Similarly, Shaw (1997) posits that confidence arises from a specific knowledge. Indeed, confidence is an "expectation which is based on knowledge that an interaction is set within a system or a context through which it is possible to impose sanctions in the case of violation of an obligation or an arrangement" (Barbalet, 1998: 87). Such expectation can be based, for example, on prior probabilities including previous experience and familiarity that make the outcome predictable. As such, confidence occurs under two main conditions: a specific hypothesis or knowledge, and certainty (the level of belief) that one has in that hypothesis or decision. That is a broader range of information is much more likely to come into play.

These conditions are different, if not opposite, to the situational antecedent of risk under which trust emerges. Indeed, trust is frequently conceptualized as being an issue in the presence of risk and uncertainty. It refers to a situation under which people both recognize and accept that they are at risk and that they are vulnerable to disappointments or negative outcomes because the acts or intentions of the other cannot be confirmed (Luhmann, 1988). In some cases, when someone does not have the capabilities to know or check on others, that person has no choice but to trust (generalized trust). Thus, while confidence is associated with known systems or contexts, trust is usually associated with the margins of these familiar contexts and has to be constantly maintained by personal interaction. As Held (1968: 157) points out: "We speak of trusting a person's opinion (which may be uncertain), but not of trusting his knowledge (which can be only what it is)". Therefore, a confidence judgment is a discrete reason-based judgment related to the probability of a specific event generally arising outside the domain of risk. However, it can occur in contexts involving risk even if risk and uncertainty are not a highly prominent aspect of the context (Adams, 2005). On the other hand, a trust judgment occurs only when something is at stake and can require extrapolation beyond the information that is immediately available for use in a broader set of inferences (Adams, 2005). As such, the scope of trust is considered to be broader than that of confidence.

In addition to confidence, trust is also used interchangeably with the term "trustworthiness". While some studies made the distinction between both concepts (Mayer,

Davis and Schoorman, 1995; McKnight, Choudhury and Kacmar, 2002; Serva, Benamati and Fuller, 2005), others do not. McKnight, Choudhury and Kacmar (2002: 337) define trustworthiness as "a confident trustor perception that the trustee has attributes that are beneficial to the trustor". On the other hand, they describe trust as a willingness to depend on an unfamiliar trustee (e.g., online retailer). The Theory of Reasoned Action (TRA) differentiates the individual's beliefs about the trustee (trustworthiness) from the individual's resulting willingness to take an action (trust). This led Serva, Benamati and Fuller (2005), for instance, to argue that trustworthiness forms the basis for trust and downstream trust-related actions. In other words, beliefs (trustworthiness) do not equate to attitudes (trust).

In this thesis, trustworthiness is considered as an individual trait or the characteristic of an organization, while trust is examined as a product of the relationship (via transactions) between consumers and the different economic actors. That is, trustworthiness can be considered as an indicator for trust to happen. In this thesis, the term trust refers to public expectations, whether of a particular institution or a particular brand name, and the various forms of social/legal control and sanctioning mechanisms that ensure performance. Having defined trust and its conditions, the next section explores its antecedents, and develops a set of hypotheses that form the basis of the conceptual model explored in the empirical analysis.

2.5 The Determinants of Consumer Confidence in Credence Attributes

In the food industry, confidence is rooted in the quality of products and trust in the supply chain. As such, confidence in food attributes refers to trust that is embedded in food products and brands as well as to the main actors that provide these final consumer products. As Poppe and Kjærnes (2003: 16) point out "when we talk about trust in food the underlying understanding is that food is not merely a material and biological "thing"… above all, the food eaten is the outcome of what has been done with it at all stages of production and distribution until it ends up on somebody's plate". The belief that consumer confidence in credence attributes is dependent on the degree to which consumers trust actors within the supply chain (government, farmers, processors and retailers) with responsibility for food safety and product quality is supported by a host of studies (Frewer et al., 1996; Rousseau et al., 1998; Grunert, 2002; Mazzocchi, Lobb and Traill, 2004a; Brunel and Pichon, 2004; Berg et al., 2005; Dierks and Hanf, 2006; De Jonge et al., 2004, 2007, 2008a, 2008b; Kjærnes, Harvey and Warde, 2007). For instance, Grunert (2002:

284) suggests that "consumers may infer the extent to which they trust the safety of a product from their general beliefs about regulators, producers and distributors". Similarly, Kjærnes, Harvey and Warde (2007) argue that trust in food is primarily the result of trust in pertinent and particularly powerful actors involved in its production, delivery and regulation. Moreover, Sodano (2002: 7) indicates that: "Consumers who pay a premium price for high quality products which have quality characteristics they can check neither before nor after the purchase, need a certain amount of "blind" trust in suppliers."

In the context of increasingly complex food systems, with consumers considerably removed from the source of production, trust in the food system as an abstract concept becomes more important. This is what Kjærnes and Dulsrud (1998) describe as "structural" or "system oriented" trust. According to Greenberg and Elliott (2009: 194), "trust in the abstract system of food production takes the form of a faceless commitment". Building on these insights, this thesis posits that consumer confidence in food attributes is affected directly by: (*i*) trust in the food system including regulatory institutions and market actors within the food chain, and (*ii*) by trust in brands. This means that trust (which involves risk of disappointment and uncertainty) may evolve into confidence (which involves specific knowledge and faith). As such, it is postulated that:

Hypothesis 1: Trust in the food system will positively influence consumer confidence in credence attributes.

Hypothesis 2: Brand trust will positively influence consumer confidence in credence attributes.

Hypothesis 3: Trust in the food system will positively influence brand trust.

Individual characteristics also play a role in shaping consumer trust in institutions and in products, and in turn in public confidence in credence attributes. Personal traits are posited to have a moderating effect in strengthening or weakening the relationship between trust in the food system and in brands and confidence in credence attributes. According to Ebert (2009:44), "consumer characteristics moderate the signals (e.g., competence, security) given by organizations". These individual differences cannot or can only minimally, be influenced by food

actors or products. In fact, depending on a person's trait, the characteristics of an organization or product could have a stronger or weaker impact on consumer trust (Ebert, 2009). For instance, a good reputation may not have a strong influence on public trust in a highly risk averse society. All these hypothesized determinants affecting consumer confidence in food safety and food quality are captured in Figure 2.1 below. The underlying factors hypothesized to affect trust in the food system and brand trust, along with the moderating effect of psychographic characteristics, are discussed in sections 2.5.1, 2.5.2 and 2.5.3, respectively.

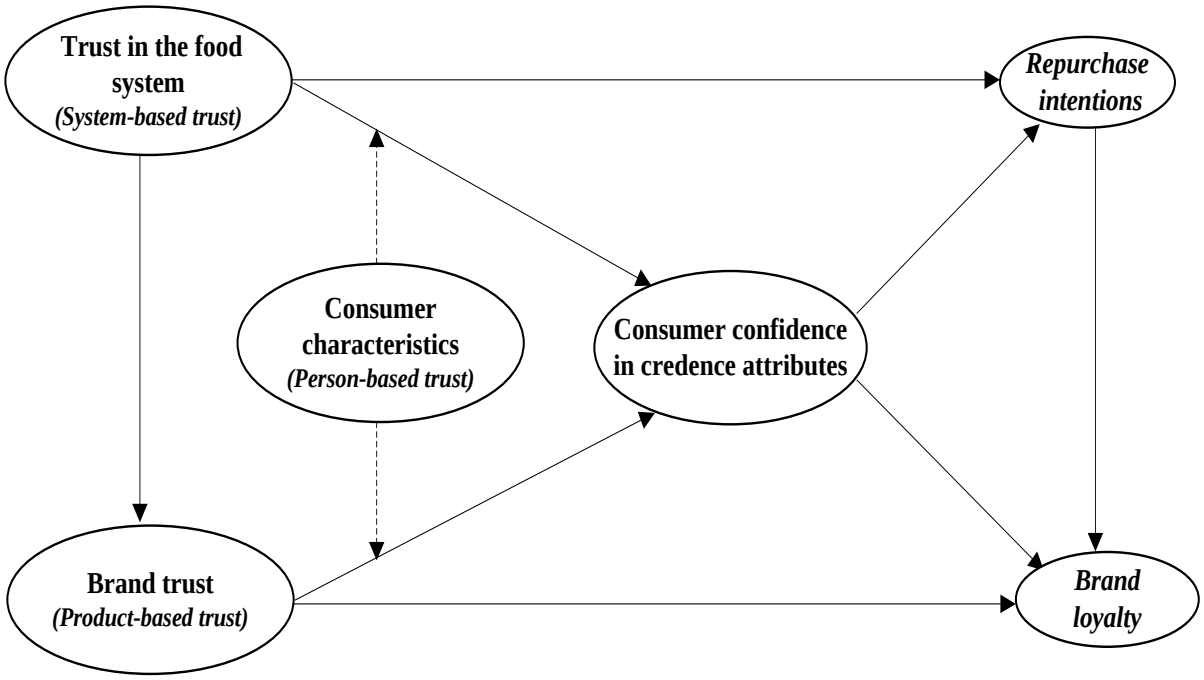

Figure 2.1: Research model for the determinants and consequences of consumer confidence in credence attributes

2.5.1 Trust in the Food System

Much of the social science literature focuses primarily on generalized trust (the belief that most others have benign intentions), however, institutional or strategic trust (the belief that others will act cooperatively because of a system of monitoring that induces them to act in a trustworthy manner) has long been recognized as playing an important role in risk perceptions (Irwin, 2009). Previous research has found convincing evidence that trust in institutions and the

food industry is negatively related to perceived risks regarding food safety incidents (Saba and Messina, 2003; Siegrist, 2000; Siegrist, Cvetkovich and Roth, 2000; Williams and Hammitt, 2001). Nevertheless, there have been wide-ranging discussions regarding what determines strategic trust.

Different disciplines have viewed institutional trust along diverse dimensions, recognizing that it is a complex multidimensional concept that cannot be predicted by a single item (Bhattacharya, Devinny and Pillutla, 1998; Butler, 1991; Frewer et al., 1996). These dimensions are likely to depend on the context (firm-to-firm, firm-to-consumer, government-to-citizens, consumer-to-product) and the target industry. As such, a comprehensive list of trust antecedents can be developed from the literature. Table 2.1 presents the dimensions of institutional trust used in some food-related studies within a buyer-seller relationship.

Table 2.1: Antecedents of institutional trust from a food context

Studies	***Trust antecedents***
Determinants of trust in the Indonesian potato industry: A comparison among groups of potato farmers (Puspitawati, 2011)	Flexibility, reputation, dependence, price transparency, firm size, joint problem solving
Consumer trust in the U.S. food system: An examination of the recreancy theorem (Sapp et al., 2009)	Competence of institutional actors, fiduciary responsibility
An empirical examination of the role of trust in consumer and supplier relationship of little direct contact: A structural equation modelling approach (Yee and Yeung, 2010)	Competence, credibility, reliability, integrity, benevolence, provision of information
How trust in institutions and organizations builds general consumer confidence in the Safety of food: A decomposition of effects (De Jonge et al., 2008b)	Care, openness, competence, honesty
Determinants of trust in food safety information (Dierks, 2005)	Trustworthiness of the source of information
What Determines Trust in Information About Food-Related Risks? Underlying Psychological Constructs (Frewer et al., 1996)	Perceptions of accuracy, knowledge and concern with public welfare

A review of these food studies shows that researchers used two, three or more dimensions to inform trust. The number and the nature of these antecedents vary from one study to another. Based on a synthesis of previous literature, it is hypothesized that trust can be determined by four potential antecedents: competence, credibility, benevolence and reputation as inherent characteristics of the food system. While none of these dimensions is new, the combination of them applied to the context of food is believed to provide a more comprehensive definition of trust in the food actors within the food supply chain. As such, when a consumer trusts an

institution or a firm in terms of its competency, credibility, public care and reputation, then he/she will tend to have confidence that the product is of an accepted quality and he/she will expect that the consumption of that product will not result in adverse health and/or environmental effects. The guarantee that the attribute the consumer is paying for exists comes from some quality assurances. Indeed, food quality and food safety signals are inherently based on trust. Being aware that the components of institutional trust are closely inter-related and are difficult to examine separately, this thesis focuses on generally accepted dimensions of trust from the literature in relation to credence attributes. These dimensions are: perceived competence, perceived credibility, perceived benevolence and perceived reputation.

Perceived food system competence

Most of the definitions of trust discussed at the beginning of this chapter emphasize the perceived belief of competence and the ability of the organization to meet its obligations and to fulfill its promises. "Competence is task and issue-specific" (Lee et al, 2008: 457). It is a set of skills including a sufficient knowledge to provide high quality products and the expertise to guarantee food safety and manage risks (e.g., Butler, 1991; Giffin, 1967; Bartol and Srivastava, 2002). In other words, knowledge of standards and expertise are two facets that reflect the competence of an actor. In many studies, competence is considered as the first marker of trust that acts to reduce uncertainty, leads to a positive attitude and so to a favourable response (e.g., Lang and Hallman, 2005; De Jonge et al., 2007). In this thesis, it is assumed that consumers perceive competence as the ability of the food actors to provide high quality products and their expertise to control the safety of food. As such, a food company is lacking competence when its products are contaminated above a level deemed appropriate by the public and it lacks the expertise to effectively remove the contaminants. Related to this, Innes (2008) found that much of the mistrust in government mentioned by a few respondents in a survey of Canadian consumers was a result of perceived lack of competence previously in areas such as creating an adequate organic standard. Therefore, it is hypothesized that:

Hypothesis 4: Perceived competence of the food system will positively influence trust in that food system.

Perceived food system credibility

Confidence in credence attributes is subject to the credibility of those signalling these attributes (i.e. food actors), as well as to the credibility of the signals (e.g., brands). Trust is involved because most food quality and food safety attributes cannot be identified or controlled by consumers. Therefore, credibility emerges as an important factor to inform consumers about credence attributes. In this context, Innes (2008: 51) argues that: "Credibility is assumed to be synonymous with someone placing trust in an organization to accurately communicate credence attributes". Credibility can be established through transparency in communicating about the product attributes, honesty in divulging food-related hazards and the reliability of the information provided. These elements allow trust to be built, perceived risk to be reduced, conflict to be resolved quickly, and opportunism to be avoided. Furthermore, making appropriate signals, sharing balanced information on the veracity of messages of food products and their production process facilitate informed decisions by consumers (Sebok et al., 2011). According to Frewer et al. (1996, 2005), the credibility of a particular organization is determined primarily by its transparency and competence. Furthermore, mistrust in a food chain actor can be associated with perceptions of information distortion and a history of providing misleading information related to food hazards. As such, correcting misinformation and addressing food safety and quality concerns quickly contribute to retaining a consumer's fidelity and signals a concern for public well-being.

Producers can signal the credibility of their claims by purchasing third-party certification services, by adopting management practices (compliance with food safety management systems, such as HACCP) or by investing in reputation and branding. In fact, a number of authors find that a favourable reputation enhances credibility and in turn trust (Ganesan, 1994; Das and Teng, 1998; Blois, 1999; Cole and Harris, 2003). Grolleau and Caswell (2006) conclude that the presence of search and experience attributes consistent with relevant claims from an organization will generate an accurate signal for credence attributes. Consumers see such consistency across attributes as an indicator of the firm's credibility which serves as a basis for building trust. The following hypothesis is derived:

Hypothesis 5: Perceived credibility of the food system will positively influence trust in that food system.

Perceived food system benevolence

The perception of trust seems to be highly dependent on the extent to which the trustee shows care and concern and acts in the interest of the other party (e.g., Peters, Covello, and McCallum, 1997). Consumers may believe that food actors are providing certain information to protect their own interests or to maintain their reputation rather than providing reliable information out of concern for public welfare. Thus, benevolence is another important dimension of system-based trust defined as the "extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric motive" (Mayer, Davis and Schoorman, 1995: 719). In the economics literature, benevolence assumes that the trustee would behave cooperatively, even if it is economically rational for the trustee to act opportunistically (Williamson, 1985). As such, a benevolent trustee should care about the needs of the trustor and protect his/her interests by refraining from self-serving opportunism. To illustrate the importance of benevolent intentions, De Jonge et al. (2008a) found that care was the most important trust dimension when investigating the relationship between Dutch consumer confidence in the safety of food and public trust in institutions.

In the literature on trust, the term benevolence has been used synonymously with other terms including "care and concern" (De Jonge et al., 2008b; Maeda and Miyahara; 2003), integrity (e.g., Yee and Yeung, 2010; White, 2005) and "affective trust" (e.g., Doney and Cannon, 1997). In this thesis, perceived system benevolence is defined as the care for public wellbeing beyond any selfish behaviour in terms of attention paid by the food actors to provide safe, high quality food and in terms of sensitivity (i.e. understanding) to the information needed by the consumer. In addition to the provision of support and expression of concern for the consumer's welfare, benevolence may also include the level of the socially and environmentally responsible initiatives (i.e., Corporate Social Responsibility or CSR) engaged in by a food company which influences consumers' perceptions and behaviour. Related to this, empirical research shows that CSR improves consumer trust (Pivato, Misani and Tencati, 2008; Vlachos et al., 2009), product purchase intentions and willingness to pay (Creyer and Ross, 1996; Maignan,

2001; Mohr and Webb, 2005), product evaluation (De los Salmones, Crespo and Del Bosque, 2005), and consumer satisfaction (e.g., Luo and Bhattacharya, 2006). As well, CSR is found to affect the reputation of a company or a brand (e.g., Brown and Dacin, 1997; Folkes and Kamins, 1999; Sen and Bhattacharya, 2001; Klein and Dawar, 2004; Sweeney, 2009; Bigne-Alcaniz et al., 2012). As such, one can argue that the perception of trust seems to be highly dependent on how the food actors show care and concern and act in the interest of the consumers. The following hypothesis is based on these insights:

Hypothesis 6: Perceived benevolence of the food system will positively influence trust in that food system.

Perceived food system reputation

Information about a market actor can be collected from formal sources (e.g., press, government agencies, financial-rating agencies, consumer agencies) or informal sources (friends, family members, colleagues) seen as reliable by the trustor. This information on the trustworthiness of an actor is defined as reputation (Picot, Reichwald and Wigand, 2001). Reputation is a result of social networks whereby diffusion of information is facilitated (Granovetter, 1985) and initial trust in the unknown may be established (Stewart, 1999). As such, the transfer of trust/mistrust can be examined from the perspective of social network theory (Granovetter, 1973), which states that informal channels of communication (e.g., word-of-mouth) are the primary means of disseminating market information when the products are difficult to evaluate, which is the case for credence attributes.

Reputation has been most frequently suggested as a factor that contributes to consumer trust in a seller organization (Anderson and Weitz, 1989; Doney and Cannon, 1997; Ganesan, 1994). In consumer marketing, the long-term reputation of the seller was found to be more important than short-term product quality movements (Landon and Smith, 1998). As mentioned previously, reputation provides certain assurances about the organization's competency, credibility and integrity, in particular when the consumer has not previously interacted with an organization (Jarvenpaa, Tractinsky and Saarinen, 1999). According to Afzal et al. (2010: 44), "reputation can be seen from past experience of third party's trustworthiness, integrity, and honesty". Doney and Cannon (1997) define reputation as the extent to which buyers believe that

an organization is honest and concerned about its customers. Both private and public organizations are looking to develop a good reputation in the eyes of consumers. Like trust, reputation is built over time and requires a long-term investment of resources. Subsequently, business has much to lose if it is perceived as untrustworthy. This is likely to be true for farmers, processors and retailers but also for regulators especially if consumers initially trust government institutions. Therefore:

Hypothesis 7: Perceived reputation of the food system will positively influence trust in that food system.

Synthesis

The thesis conceives system-based trust as a multidimensional process comprising four important facets: competence, credibility, benevolence and reputation. These dimensions are interrelated and form a component of a multilayered model that is developed further in chapter 3. Government, farmers, food processors and food retailers are the main actors within the food system examined in this analysis. They represent the potential sources of information on food credence qualities and are directly involved in an exchange market. These players have a responsibility for guaranteeing food quality (including food safety) and communicating about credence characteristics, which is increasingly done through alliances between them. Indeed, food quality and food safety are shared responsibilities across the food supply chain. This suggests that both public and private entities have an incentive to avoid any erosion of trust, particularly as trust can be lost more quickly than it can be gained and sometimes a single deceit may offset many years of acting with credibility. In other words, violation of trust can be very critical for a firm. For instance, the implications of a major food safety failure can be commercially damaging for the food industry, including product recalls, the effects of damaged reputation on market share, and punitive liability damages (Hobbs, 2006). Likewise, loss of confidence is also critical for government agencies (especially if consumers initially trust government authorities or institutions) which can lose credibility in their ability to protect consumers. Therefore, it is proposed that the degree of consumer confidence in credence attributes depends upon the level of trust in the food actors. As well, this confidence is expected

to be determined by the trust in the characteristics of a product, such as its brand name, which is examined in the next section.

2.5.2 Brand Trust

Unlike the concept of institutional trust that has received notable discussion in several different branches of the social sciences literature, brand trust has escaped similar extensive attention in consumer studies, especially those positioned in a consumer-brand setting. Despite the increase in food product branding (retailer private labels and manufacturer brands), the scant attention to brand trust may be attributed to the lack of understanding of how theories of institutional trust can be applied to objects such as brands (Delgado-Ballester, 2004). Nevertheless, brand trust is expected to have an important influence on consumer confidence in credence qualities and in the development of brand loyalty. Additionally, no real consensus exists either on a standard definition of the concept of brand trust, on its dimensionality or approaches to its measurement (Gurviez and Korchia, 2002; Li et al., 2008). According to Delgado-Ballester, Munuera-Aleman and Yague-Guillen (2003) the nonexistence of a more widely accepted measure of the concept of brand trust is surprising since trust is viewed as the cornerstone of a relationship and one of the most important dimensions of a brand. The discrepancy in conceptualisation and measurement scales points to the need for further clarification and investigation of the concept.

Delgado-Ballester, Munuera-Aleman and Yague-Guillen (2003: 11) define brand trust as a "feeling of security held by the consumer in his/her interaction with the brand, that it is based on the perceptions that the brand is reliable and responsible for the interests and welfare of the consumer". Chaudhuri and Holbrook (2001: 82) define brand trust as "the willingness of the average consumer to rely on the ability of the brand to perform its stated function". Similarly, Lau and Lee (1999: 344), describe brand trust as "a consumer's willingness to rely on the brand in the face of risk because of expectations that the brand will cause positive outcomes". These definitions are in consonance with the conditions and drivers of trust in terms of risk involvement and reliance on a promise. In fact, consumers tend to perceive brands as products with added value that makes them different from generic counterparts.

Recent studies have examined brand trust as a multidimensional concept and provided a measurement scale of the construct (see Table 2.2). In consonance with these studies, this thesis conceives brand trust as a multilayered construct. Branded food products reflect a set of tangible and intangible aspects believed to have specific qualities that drive consumer trust in that brand. As such, a consumer's level of trust in a brand is expected to be a combination of specific attitudes about the brand including its performance, competence, and benevolent intentions (Li et al., 2008). In addition, from a methodological perspective, breaking the concept of brand trust down into its more specific dimensions has the advantage of yielding more reliable empirical results. Rather than asking the consumer a vague all-encompassing question about his/her trust in a brand, that question can be split into a number of more specific questions which a consumer should be able to answer more easily and more accurately.

To model the relationship between brand trust and its antecedents, a scale of brand trust that encompasses as many relevant measures as possible is required. Table 2.2 summarizes the dimensions of brand trust adopted in various studies, virtually all about non-food brands, and which inform the development of a measurement scale of food brand trust in this thesis.

Table 2.2: Antecedents of brand trust

Studies	***Brand trust antecedents***
Consumer's trust in the brand: Can it be built through brand reputation, brand competence and brand predictability (Afzal et al., 2010)[a]	brand reputation, brand competence, brand predictability
Brand trust as a second order factor: an alternative measurement model (Li et al., 2008)[b]	competence, benevolence
Factors influencing consumer perceptions of brand trust online (Ha, 2004)[c]	security, privacy, brand name, word-of-mouth, experience, information
Development and validation of a brand trust scale (Delgado-Ballester et al., 2003)[d]	fiability, intentionality
Applicability of a brand trust scale across product categories: A multigroup invariance analysis (Delgado-Ballester, 2004)[e]	brand reliability, brand intentions
Proposal for a multidimensional brand trust scale (Gurviez and Korchia, 2002)[f]	credibility, integrity, benevolence
Consumers' trust in a brand and the link to brand loyalty (Lau and Lee, 1999)[g]	brand predictability, brand liking, brand competence, brand reputation, trust in the company
Construction and assessment of a scale to measure consumer trust (Hess, 1995)[h]	Brand honesty, altruism, reliability

[a]: non-durable brand items (favourite consumer brand); [b]: various product categories - detergent, beer, digital camera, laptop computer, car and wireless phone service; [c]: e-bookstore (e.g. Amazon.com); [d]: deodorant; [e]: deodorant and beer; [f]: cosmetics, Coca-Cola; [g]: non-durable goods (favourite brand), [h] cars

A review of these primarily non-food studies shows that the factors influencing brand trust include a number of brand characteristics (e.g., competence, reputation), firm characteristics (e.g., integrity, reputation) and consumer characteristics related to the brand (e.g., experience, satisfaction). Furthermore, brand trust has been operationalized mainly as a two or three dimensional concept. For instance, Delgado-Ballester, Munuera-Aleman and Yague-Guillen (2003) developed a reliable and valid brand trust scale encompassing the fiability and intentionality dimensions, yet they recommended additional studies that identify and analyze other antecedents of brand trust such as brand reputation. As such, this section proposes a more comprehensive understanding of brand trust and synthesizes four potential dimensions: competence, credibility, benevolence and reputation with respect to inherent quality attributes of food brands. Each of these antecedents is expected to contribute to brand trust, as detailed below.

Perceived brand competence

Consumers are expected to demand high quality food that is safe to eat. As such, a competent brand should provide a consumer with a consistent quality (including safety) that drives him/her to trust that brand. It is posited that good brands must have compatible attributes with customers' expectations and needs (Afzal et al., 2010). Aaker (1991) suggests that strong brands are associated with higher perceived quality, *ceteris paribus*. A number of studies found that perceptions of brand competence were developed through either direct usage or word-of-mouth and suggest that competence is an essential component of brand trust (Lau and Lee, 1999; Afzal et al., 2010). When a consumer perceives that a food brand matches his/her needs with respect to safety and quality, it is postulated that he/she is more likely to trust that brand. The following hypothesis is derived:

Hypothesis 8: Perceived brand competence will positively influence brand trust.

Perceived brand credibility

Building trust in credence attributes is challenging for two reasons. First, food producers and processors usually cannot easily verify these credence attributes through traditional testing methods or measurement. Second, consumers cannot assess credence quality either before, during or after consumption (Darby and Kami, 1973). As such, consumers' perceptions of the quality of a product is a question of the number of, and trust in, cues signalling the credence features of food products. Thus, mechanisms like labelling, certification and branding help consumers to gather information on the product, the producer and the practices used. In this context, brand credibility is defined as the "believability of the product information contained in the brand, which requires that consumers perceive that the brand has the ability (i.e. expertise) and willingness (i.e. trustworthiness) to continuously deliver what is promised" (Erdem, Swait and Valenzuela, 2006: 35).

As such, credible brand information may increase perceived quality (including food safety) by creating favourable attribute perceptions and so the (pecuniary) value of the product. Indeed, the literature has suggested that brands can reduce perceived risk by becoming credible and consistent symbols of product quality (e.g., Aaker, 1991; Montgomery and Wernerfelt, 1992;

Erdem and Swait, 1998). For instance, Aaker (1991) suggests that higher perceived quality, lower information costs and lower risks associated with credible brands may increase consumer evaluations of brands. Related to this, and based on U.S. survey data on jeans and juice, Erdem and Swait (1998) found evidence that expected utility increases with perceived quality and decreases with perceived risk and information costs. Thus, firms use brands as a risk-reduction mechanism through which they communicate credence attribute information (Doney and Cannon, 1997). Building on these insights, it is expected that:

Hypothesis 9: Perceived brand credibility will positively influence brand trust.

Perceived brand benevolence

Brand benevolence reflects a firm's intentions toward the consumer. Delgado-Ballester, Munuera-Aleman and Yague-Guille (2003) refer to this dimension as "intentionality". The thesis considers brand benevolence as the perceived (health/social/environmental) benefits that could be gained from buying and/or consuming the product. As such, it is expected that a consumer believes that the brand is benevolent when there is no major harm (e.g., health risk) to purchase or consume it. Consumers' beliefs toward brand benevolence reflect a certain level of trust in a firm to have a positive orientation (i.e. responsible care) vis-à-vis its consumers beyond any self-interest. Related to this, De Jonge et al. (2006) found that care for public welfare is the most influential way to earn consumer confidence in the safety of food, much more than competence and openness. Similarly, Delgado-Ballester (2004) argues that brand intentions weigh more heavily than brand reliability because the latter is based on experience which is not necessarily an accurate barometer. Additionally, a branded product produced using environmentally-friendly methods is an illustration of the benevolence dimension. In fact, Barnes (2011) found that the more socially responsible the company is, the larger the effect of corporate social responsibility or CSR is on brand trust. Therefore, it is proposed that:

Hypothesis 10: Perceived brand benevolence will positively influence brand trust.

Perceived brand reputation

Brand reputation encompasses the consumer's belief that the brand is reliably higher quality compared with other brands, which may be reflected in willingness to pay a price

premium. Brands are distinct from other marketing mix elements that signal quality (e.g., high price, warranty) in the sense that brands reflect the cumulative effect of the previous activities of a firm. This notion of the sum of past behaviours is referred to as reputation in the information economics literature (Herbig and Milewicz, 1995). Furthermore, branding and reputation are seen to be more effective in mitigating signalling problems compared to other strategies, especially in the case of credence attributes (Sporleder and Goldsmith, 2001). If the actions of a firm are consistent and its promotional communication is honest, a brand is expected to create a positive image, which in turn engenders consumer trust.

In addition to past experience, brand trust is said to be influenced by the experiences and opinions of other consumers. Indeed, if people are suggesting the usage of a brand then it is considered as a sign of good reputation (Afzal et al., 2010). Positive word-of-mouth (transmitting consumers' own experiences to other consumers) was found to create trust and confidence as part of consumers' pre-purchase information perceptions (Ha, 2002). On the other hand, if a brand has a poor reputation (e.g., negative word-of-mouth or rumours), consumers may not trust the brand sufficiently to purchase it. Consequently, the following hypothesis is derived:

Hypothesis 11: Perceived brand reputation will positively influence brand trust.

Synthesis

The section has explored the antecedents of brand trust including competence, credibility, benevolence and reputation. There is an apparent parallel between the dimensionality of trust in the food system and in a brand. This is not surprising since the brand is a construct of the firm and trust may occur at different levels (between persons, toward organizations or products). In the previous section, the dimensions of trust are explained with respect to characteristics of the participants within the food system. In this section, the entity trusted is not a person or an organization, but a product's attributes. Trusting a brand and the related firm/producer are likely to be correlated (Hypothesis 3) and this thesis treats them separately for methodological purposes. In addition, the analysis deals with a brand as a quality cue under uncertainty which is the information economics view of brands. In other disciplines, particularly in marketing, brand is conceived beyond the perspective of the economics of information approach. For example, the

brand is not only a representation of a company's product but also is a reflection of the firm's culture and values and that is where brand loyalty emerges as a consequence of brand trust.

To summarize, brands help consumers form quality expectations and allow consumers to draw on their previous experience with the product. In fact, a satisfactory quality experience after one purchase can pave the way to a future repurchase (Grunert, 2002). That is, if a consumer is happy with a particular brand, the likelihood of a recurring purchase increases due to the benefits gained, including low perceived risk and low information costs, which enhance consumer utility. In other words, repeated exchange engenders trust which evolves to confident expectations about the brand overall performance. Hence, a consumer's past experience is one among other important personal factors that impact consumer confidence in food safety and quality attributes. These individual factors are examined in the next section.

2.5.3 Personal Characteristics

Since trust is defined as a psychological state, then consumers' psycho-socio-economic characteristics should contribute to confidence in food safety and quality attributes. Trust is about perceptions; it shapes consumer preferences and attitudes and influences behavioural intentions, particularly for credence attributes where consumers may rely on brand images, labels, advertising and social networks to form opinions. Trust is gained over time and is built upon previous experiences. Both extrinsic (demographic) and intrinsic (psychographic) factors provide additional insights into the willingness to trust a brand or the food system, and more generally into a consumer's confidence in food.

Among the intrinsic factors investigated here, of particular interest is how past experiences (whether product experience or frequent interactions with a particular actor in the food system) and consumer concerns influence confidence in brand attributes. These worries are often framed as a question dealing with risk aversion in health and environmental hazards. Two major categories of consumer concerns are examined: (*i*) risk aversion, reflecting consumers' concerns about food-related hazards and (*ii*) ethically-motivated behaviour, reflecting interest in food production and processing practices. The health-related concerns and production-related concerns are related, yet distinct.

The three identified psychographic characteristics (i.e. past experience, risk aversion and ethical involvement) are posited as moderating variables of the trust-confidence link in the theoretical model (see chapter 3). This means that the relationship between confidence in credence attributes, trust in the food system and brand trust may be contingent on the degree of risk aversion, past consumer experience, and ethically-motivated behaviour. For example, the impact of brand trust on confidence may vary by group (high levels versus low levels of risk aversion). These three aspects of personal-based trust account for unobserved heterogeneity among consumers and are considered as moderators because they are independent of, yet influenced by, the food system or the brand.

Some studies on trust have examined individual factors as moderating variables to test the relationships between concepts using a Structural Equation Model framework. For instance, Ebert (2009) conceives three consumer characteristics, namely: involvement, satisfaction and trust propensity as moderators in trusting the bank industry. Mayer, Davis and Schoorman (1995) consider that perceived risk moderates the relationship between trust and risk taken in the context of organizational trust. Sirdeshmukh, Singh and Sabol (2002) suggest that perceived risk in a specific industry moderates the trust-loyalty relationship within an exchange. Moreover, Matzler, Grabner-Kräuter and Bidmon (2006) show that the strength of the relationship between hedonic value, brand trust and brand loyalty is strongly influenced by consumer involvement, price consciousness, brand consciousness and gender, but not age. The personal factors selected for this thesis are discussed below.

Risk aversion

By nature, it is expected that some people are trusting and have low levels of risk aversion, while others are less trusting and may also be more risk averse. Empirical results show that perceived risk leads the consumer to consider more alternatives by increasing "the size of the evoked set of brands" (Srinivasan and Ratchford, 1991: 235). Perceptions of food safety hazards include the extent to which consuming a food product may expose consumers to a health risk (Schroeder et al., 2007). In this context, there is a large volume of research within the framework of risk attitudes and risk communication where a direct relationship between mistrust in regulatory agencies and risk perceptions has been found (Slovic, 1997). Notably, empirical

results show that perceived risk is unlikely to affect consumer choices when there is no related food scare, but when there is a scare the intention to purchase is affected, depending on the levels of risk perceived (Mazzocchi, Lobb and Trail, 2007). As such, trust (in the food system or in a brand) is likely to have a lower impact on overall consumer confidence in credence attributes under high-risk aversion. Therefore, the following hypothesis is suggested:

Hypothesis 12: Low (high) levels of risk aversion will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

Past consumption experiences

In addition to risk attitudes, past experience is also expected to influence the consumer's overall level of confidence in food attributes (De Jonge et al., 2008b). The dynamic nature of trust is explained by the fact that trust is built on past experiences and develops as the relational interactions mature (Rempel, Holmes and Zanna, 1985). Dasgupta (1988: 59) indicates that "for trust to be developed between individuals they must have repeated encounters, and they must have some memory of previous encounters." In this regard, Uslander (2008) bases strategic trust on experience. Furthermore, the literature suggests that prior experience may act as a moderator in the case of products high in credence properties, such as food and many services (e.g., medical, legal and financial services) because inexperienced individuals have difficulty in confidently assessing product outcomes (Patterson and Johnson, 1995; Sharma and Patterson, 2000).

Experience emanates from a consumer's past usage of a brand and/or from repeated interactions with a particular food actor (i.e. retailer, producer, and farmer). Product experience represents prior product knowledge and information about how a product should perform (Sharma and Patterson, 2000). Experiences allow a consumer to know more about a particular brand and/or a food actor and lead him/her to trust more or less. Related to this, Srinivasan and Ratchford (1991: 240) posit that "experience allows consumers to learn how to search efficiently" and their empirical findings show that a positive experience makes it more likely that a consumer will limit his/her evoked set of products to the brands that are related to the positive experience, and consequently to search less. As such, experience accumulated through repeated

purchase helps improve the consumer's ability to predict the brand's or a food actor's performance. Such experience allows them to develop confidence in assessing the performance of that product, which otherwise would be very difficult due to the credence qualities of food. Thus, a satisfactory experience may reduce risk perceptions and in turn may enhance trust and so general consumer confidence in food, and vice versa. That is trust (in the food system or in a brand) is expected to have a stronger impact on consumers' overall confidence in credence attributes in the wake of positive prior experiences. Hence, it is hypothesized that:

Hypothesis 13: Good (Bad) past experiences of consumers will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

Ethical involvement

With the rise of ethical consumerism, consumers are increasingly integrating ethics into their food purchase decisions. Over the past couple of decades, there has been an upward trend in consumer awareness about quality and food safety, often linked to farming and food processing methods (Knutson and Josling, 2009). In addition to the chemical residues in food, to microbiological pathogens, and to animal disease-related food safety issues (e.g., BSE), consumers are seeking quality in terms of animal welfare and environment assurances. In fact, it has been suggested that general long term consumer concerns about current food production methods are responsible for low consumer confidence in the safety of food in general (Smith, Young and Gibson, 1999). Furthermore, when comparing consumer confidence in food safety in Canada and the Netherlands, De Jonge et al. (2008a) found that Canadians seem to be more concerned about production and health related issues compared to Dutch consumers.

The literature review suggests that there is neither a clear definition nor a best way to measure public involvement. According to Mittal (1995), the measurement model to use for consumer involvement should depend on the situation as well as on the type of involvement studied. On the other hand, scholars agree on two forms of involvement: enduring involvement (also called product involvement) and situational involvement (e.g., Laurent and Kapferer, 1985; Zaichkowsky, 1985; Richins and Bloch, 1986). While the former reflects a concern with the (social and environmental) attributes of a product, the latter refers to involvement in a specific

situation such as a purchase occasion. As such, ethical involvement can be intentional or behavioural. Related to this taxonomy, a gap may exist between consumer buying intentions and effective purchase (De Pelsmacker, Driesen and Rayp, 2005; Strong, 1996). That is, concerns about animal welfare or genetic engineering do not necessarily lead a consumer to purchasing animal friendly or GM-free food. With this in mind, the construct of ethical involvement in this thesis is gauged by both intentional and behavioural dimensions. This should reveal to what extent actual consumer behaviour matches the ethical motivation. Based on these insights, the following hypothesis is deduced:

Hypothesis 14: High (low) levels of ethical involvement will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

Thus far, the three selected consumer characteristics are considered as constructs themselves. The items proposed to measure these constructs are outlined in chapter 3. Furthermore, socio-demographic characteristics such as age, gender and education are also posited to moderate the trust-confidence link. Further detail on these moderators is provided in the empirical analysis.

2.6 The Outcomes of Consumer Confidence in Credence Attributes

It has been recognized that trust predicts future intentions, guides consumers' decision-making and influences customer loyalty (e.g., Moorman, Deshpandé and Zaltma, 1993; Morgan and Hunt, 1994; Garbarino and Johnson, 1999; Yee, 2002). For instance, Yee and Yeung (2002) found a significant and positive causal relationship between consumer trust in livestock farmers and their likelihood of purchasing meat, while in an analysis of over 100 food and non-food brands Chaudhuri and Holbrook (2001) found a strong positive relationship between brand trust and brand loyalty. In other words, brand trust appears to serve as a key determinant of brand loyalty. According to Morgan and Hunt's Commitment-Trust theory (1994), brand trust leads to brand loyalty because trust creates highly valued relational exchanges.

Brand loyalty can be defined according to behavioural, attitudinal, or choice perspectives (Javalgi and Moberg, 1997). Behavioural loyalty is related to purchases of a particular brand, while attitudinal loyalty incorporates consumer preferences and commitment towards brands (i.e.

future purchasing intentions). The choice perspective focuses on the reasons for purchases or the factors that may influence choices (Jalilvand, Samiei and Mahdavinia, 2011). This thesis examines brand loyalty under the behavioural and attitudinal approach where loyalty can be defined as the willingness of a consumer to repurchase a product or the brand. It is the deeply held commitment to repurchase a preferred product or a brand consistently in the future, despite situational influences and marketing efforts having the potential to cause switching behaviour (Oliver, 1997). It is expected that this commitment is generated by a certain level of trust in the food system and in brands. In fact, if consumers hold a positive attitude toward the food system (say they perceive it as trustworthy) or toward particular food products, then perceived uncertainty will be reduced. In contrast, if consumers have a low level of trust, this might discourage the decision to purchase presently or repurchase in the future. Thus, it is anticipated that the trusting concepts (i.e. trust in the food system, brand trust and confidence in food attributes) enhance repurchase intentions and lead to brand loyalty. That is:

Hypothesis 15: Consumer confidence in credence attributes will positively influence (a) repurchase intentions and (b) brand loyalty.

Hypothesis 16: Trust in the food system will positively influence repurchase intentions.

Hypothesis 17: Brand trust will positively influence brand loyalty.

Hypothesis 18: Repurchase intentions will positively influence brand loyalty.

2.7 Conclusions

In this literature-based chapter, the concept of trust is explored comprehensively from different perspectives. A thorough attention to how the construct is applied with respect to the food system and brands in the agri-food domain is provided. Trust is theorized as a potential process "that may maintain or create confidence" (De Jonge et al., 2004: 846). Despite the large body of work on institutional trust and its dimensionality, brand trust has yet to receive as much attention. This is despite the growth in both retailers' private labels (store brands) and manufacturers' brands differentiated on the basis of quality and safety standards. Thus, this thesis seeks to begin addressing the gap in the brand trust literature. From this perspective, and unlike how branding is dealt with in the marketing field, this thesis tackles brands as extrinsic cues of food quality that inform consumers' food buying decisions. However, the effectiveness

of a brand depends heavily on the extent to which consumers trust such a signal as indicative of quality, which in turn depends on its credibility, competence, reputation and benevolence.

Since the main objective is to explore consumer confidence in credence attributes, which is assumed to depend on the level of trust toward an actor and toward a brand, it is evident that there is a link between the trust in a food manufacturer or a food retailer and the related brand supplied. That is, a consumer may not trust a brand if he/she does not trust its producer or retailer. For this reason, it turns out that the dimensions that lead consumers to trust an actor are the same ones that drive him/her to trust a branded product. In trusting an actor or a brand, a consumer also draws upon his/her perceptions, attitudes and experiences. This chapter has presented a comprehensive discussion of the postulated determinants of trust namely: competence, credibility, benevolence and reputation. The hypothesized relationships between the constructs are summarized in Table 2.3 and Figure 2.2 below.

Table 2.3: Deduced hypotheses

H1	Trust in the food system will positively influence consumer confidence in credence attributes.
H2	Brand trust will positively influence consumer confidence in credence attributes.
H3	Trust in the food system will positively influence brand trust.
H4	Perceived competence of the food system will positively influence trust in that food system.
H5	Perceived credibility of the food system will positively influence trust in that food system.
H6	Perceived benevolence of the food system will positively influence trust in that food system.
H7	Perceived reputation of the food system will positively influence trust in that food system.
H8	Perceived brand competence will positively influence brand trust.
H9	Perceived brand credibility will positively influence brand trust.
H10	Perceived brand benevolence will positively influence brand trust.
H11	Perceived brand reputation will positively influence brand trust.
H12	Low (high) levels of risk aversion will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.
H13	Good (Bad) past experiences of consumers will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.
H14	High (low) levels of ethical involvement will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes
H15	Consumer confidence in credence attributes will positively influence (a) repurchase intentions and (b) brand loyalty.
H16	Trust in the food system will positively influence repurchase intentions
H17	Brand trust will positively influence brand loyalty.
H18	Repurchase intentions will positively influence brand loyalty.

As can be seen from Figure 2.2, hypotheses 1, 2 and 3 describe the postulated relationships between consumer confidence in food attributes, trust in the food system and brand trust. Hypotheses 4 through 7 describe the posited relationships between trust in the food system and its antecedents, while hypotheses 8 through 11 refer to the relationships between brand trust and its four dimensions. Hypotheses 12, 13 and 14 refer to the expected moderating effects of personal characteristics. Finally, hypotheses 15 through 18 describe the outcomes of trust and confidence. The next chapter builds upon these hypotheses to formalize the constructs of trust and confidence in a conceptual model using a Structural Equation Modelling approach.

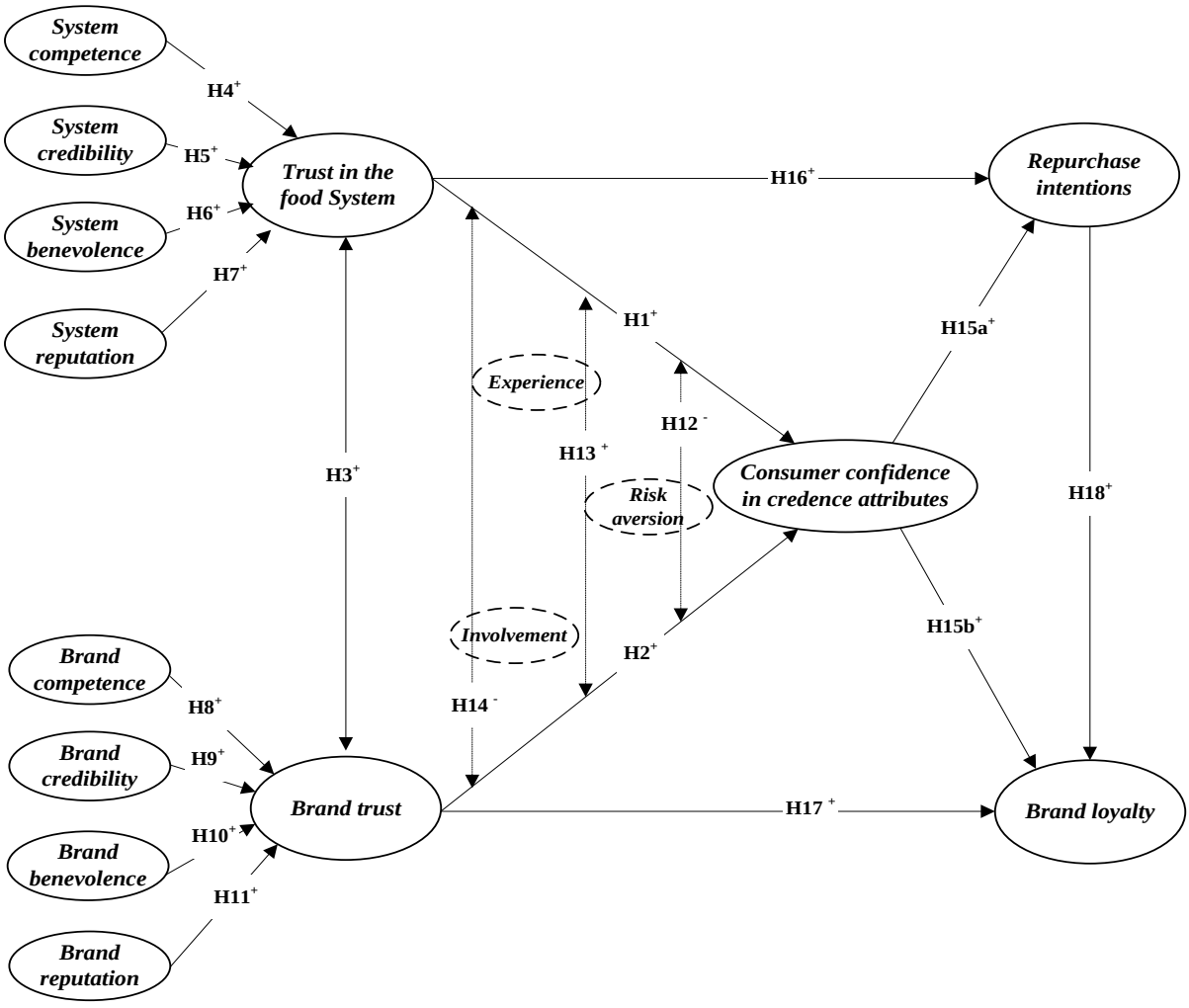

Figure 2.2: Proposed model of consumer confidence in food

Chapter 3 - The Conceptual Framework: A Structural Equation Model

3.1 Introduction

This chapter describes the modelling approach adopted to meet the aim and objectives of the thesis. Multidimensional constructs are helpful in explaining higher-order concepts that span their component dimensions. As such, a Structural Equation Modelling approach is selected as a relevant methodological approach to examine the layered dimensions underlying consumer trust and confidence outlined in the previous chapter. Structural equation modelling is a powerful statistical tool suitable for measuring relationships between several constructs and thus for testing several theoretical relationships. The organization of this chapter is as follows. Section 3.2 defines SEM and its steps. Section 3.3 compares and contrasts two measurement models: reflective and formative. Section 3.4 introduces the proposed SEM for consumer confidence in food quality and food safety. Lastly, section 3.5 concludes the chapter.

3.2 Structural Equation Model: Definition and Steps

3.2.1 What is SEM?

SEM was first conceived by Wright (1918, 1934), a biometrician who developed the path analysis method to analyse genetic theory in biology. Not until the 1960s was SEM introduced into sociology and subsequently it has been increasingly adopted in other disciplines and has spread to diverse applications. Both methodological advances and improved interfaces in various SEM software packages, notably LISREL (LInear Structural RELations), have resulted in the wide usage of SEM and its accessibility in numerous areas such as the social and behavioural sciences, bio-statistics and epidemiology (Bollen and Noble, 2011). In particular, the use of SEM has increased among educational researchers who have found this sophisticated technique to be well-suited to tackle a variety of research questions and analyse complex pattern of relationships (MacCallum and Austin, 2000; Teo and Khine, 2009). SEM consists of a number of equations with several explanatory variables in each equation. The variables in a model are either endogenous (explained) or exogenous (explanatory) variables. Since the dependent variable in one equation might be an independent variable in another equation, it is more appropriate to consider a variable as endogenous or exogenous rather than dependent or independent (Bollen

and Noble, 2011). Furthermore, the variables can be latent (no data in the dataset) or observed (with values in the dataset). A latent variable cannot be measured directly; it is measured by indicators (also called manifest variables, observed measures or items) which are usually questions in a survey (Blunch, 2008).

Two main components of models are distinguished in SEM: (*i*) the measurement model (outer model) that describes the relationship between constructs or latent variables and their indicators, and (*ii*) the structural model (inner model) that defines the causal dependencies amongst the constructs. Path analysis is a special case of SEM that contains only the structural part, while exploratory and confirmatory factor analysis models have only the measurement part. Furthermore, the SEM literature identifies two different types of measurement models: (*i*) the reflective model, in which the causality flows from the construct to the measures and (*ii*) the formative model in which the direction of causality is from the measures to the construct (see section 3.3). On this basis, this chapter seeks to specify the types of model (reflective versus formative) that should be applied to the constructs of confidence and trust and their antecedents in order to build an appropriate model. In particular, the model specification is justified based on a set of well-known criteria from the literature that help reduce the risk of model misspecification, a potential challenge with SEM beside others which is detailed further below (section 3.2.2).

SEM provides the researcher with the flexibility to model complex relationships among several predictor and criterion variables, to conceptualize unobservable latent variables, to model measurement errors for observed variables, and to statistically test *a priori* (as a confirmatory analysis) theoretical propositions against empirical data (Chin, 1998). Other methods of analysis would require several separate analyses to do so. Thus, SEM is more versatile than other multivariate techniques since it allows for simultaneous, multiple dependent relationships between variables (Hoe, 2008). By evaluating complex models with several observable variables (indicators) per latent variable, SEM leads to more valid conclusions on the construct. Furthermore, since SEM explicitly includes measurement errors of observed variables, conclusions about relationships between constructs are not biased by measurement error and thus are reliable. In other words, when relationships among factors are examined, the relationships are free of measurement error because the error has been estimated and removed, leaving only

common variance (Ullman and Bentler, 2004). Therefore, SEM procedures provide much more rigorous tests of construct validity when applied correctly (e.g., Bagozzi, 1980; Fornell and Larcker, 1981; Gerbing and Anderson, 1988). Yet, along with the advantages that SEM offers comes a higher level of complexity requiring greater knowledge of the conditions and assumptions for appropriate usage. Without due consideration, the results and conclusions can be seriously flawed (Chin, 1998). Potential problematic issues in applying SEM are the focus of the next section.

3.2.2 Steps in SEM

In performing SEM, a number of basic modelling steps should be considered, namely: (1) specification, (2) identification, (3) estimation, (4) evaluation (i.e. assessment of fit) and (5) modification or re-specification. In each of these steps lie potential technical challenges in the application of SEM. An overview of each step is given below.

Model specification

Model formulation involves specifying the main latent variables and how they relate to each other (i.e. the hypotheses that form the path model). It also involves building the measurement model that specifies the relationship between the latent and observed variables and whether there are any correlated unique factors (errors) predicted (Bollen and Noble, 2011). As such, misspecification exists in structural and measurement models.

The information necessary to specify the composition of the matrices of the latent variables and measurement models depends on the substantive expertise of the researchers and the extent to which the model is based on a clear set of theoretical predictions, otherwise interpretational confounding, which is a problem of structural misspecification may occur. Interpretational confounding "occurs as the assignment of empirical meaning to an unobserved variable which is other than the meaning assigned to it by an individual *a priori* to estimating unknown parameters. Inferences based on the unobserved variable then become ambiguous and need not be consistent across separate models" Burt (1976: 4). All models are in practice approximate and hence susceptible to interpretational confounding, which like misspecification, "occurs in degrees rather than being present or absent" (Bollen, 2007: 223).

A structurally misspecified model refers to a model "in which there are omitted paths, omitted variables, incorrect dimensionality, or omitted correlated disturbances or correlated exogenous variables that are present in the true model but absent in the estimated model" (Bollen, 2007: 221). It can also refer to models that include unneeded paths, variables, or correlations that are absent in the true model, however, omitted relationships are more problematic than the inclusion of extra parameters (Bollen, 2007).

Misspecification in measurement models may exist when a latent construct is conceptualized with reflective (formative) measures when instead it should be formative (reflective). A number of scholars conducted methodological studies in which they have presented examples of constructs modelled erroneously as reflective constructs, although a formative approach would have been theoretically suitable (e.g., Cohen et al., 1990; Diamantopoulos and Winklhofer, 2001; Rossiter, 2002; Jarvis, MacKenzie and Podsakoff, 2003; Söllner and Leimeister, 2010).

By way of illustration, analysing 57 articles on trust, Söllner and Leimeister (2010) found that about 89% of the measurement models were incorrectly specified, among which 68% of the articles that had reflective measurement models should have used formative models according to both theoretical constructs of trust and the measurement model background provided in the paper. Among these articles, Klein and Rai (2009) used a reflective measurement model for the three latent variables: ability, benevolence and integrity as the dimensions of trust in their paper on strategic information flows in logistics supply chain relationships. Söllner and Leimeister (2010) indicate that this is a misspecification because one's beliefs about the trustor's ability is created by the beliefs that he is competent, performs his roles well and is knowledgeable; not the other way around (the same for benevolence and integrity). Furthermore, Söllner and Leimeister (2010) found that in many articles (e.g., Malhotra and Murnighan, 2002; Rafaeli, Sagy and Derfler-Rozin, 2008; Rai, Maruping and Venkatesh, 2009; Sia et al., 2009; Cyr et al., 2009) the construct of trust was directly elicited in one or more survey questions which makes the scale improper for a latent variable. Unfortunately, the degree of misspecification of measurement models in the trust literature is extremely high, which may explain the considerable gap between theoretical and conceptual research on trust and empirical applications.

Misspecification of the direction of causality between the constructs and their measures leads to Type I and Type II errors,[1] to biased estimators and, therefore, to unreliable results and inaccurate conclusions about the structural relationships between constructs (Diamantopoulos and Sigua, 2006; Söllner and Leimeister, 2010). The misspecification is explained by the difficulty in selecting correctly between a reflective and a formative measurement perspective as "the directionality of the relationship is far from obvious" (Fayers et al., 1997: 393). Indeed, many indicators may be simultaneously both causal (formative) and effect (reflective) in nature (Fayers et al., 1997). While the testing procedure for reflective measures in the marketing literature is well established, it is not until recently that a procedure for validating the scale for formative indicators was developed (Diamantopoulos and Winklhofer, 2001). Since the formative indicators differ from the reflective indicators, it is more difficult to establish the validity of such a measurement scale (MacCallum and Browne, 1993; Diamantopoulos and Winklhofer, 2001).

This complexity has been widely recognized by many researchers (e.g., Hulland, 1999; Edwards and Bagozzi, 2000; Bollen and Ting, 2000, Diamantopoulos and Siguaw, 2006). For instance, Hulland (1999: 201) notes that "the choice between using formative or reflective indicators for a particular construct can at times be a difficult one to make". Likewise, Bollen and Ting (2000: 4) state that "establishing the causal priority between a latent variable and its indicators can be difficult". In short, it cannot be taken for granted that scholars will always make the choice of the correct model when measuring constructs (Diamantopoulos and Siguaw, 2006). Surprisingly, the choice between formative and reflective models, which substantially affects estimation results, has hitherto received scant attention in the literature (Jarvis, MacKenzie and Podsakoff, 2003; Freeze and Raschke, 2007). Furthermore, Anderson and Gerbing (1982:453) indicate that "the reason for drawing a distinction between the measurement model and the structural model is that proper specification of the measurement model is necessary before meaning can be assigned to the analysis of the structural model". As such, "convergence in measurement should be considered a criterion to apply before performing the causal analysis because it represents a condition that must be satisfied as a matter of logical necessity" (Bagozzi, 1981: 376).

[1] Type I (Type II) error means that the researcher models the construct as reflective (formative) while the formative (reflective) perspective would have been theoretically appropriate (Maggino and Zumbo, 2012).

Model identification

Structural models can be just-identified, under-identified or over-identified (Byrne, 2001). When the estimable parameters in a SEM (i.e. factor loadings, regression coefficients, and variances of latent variables) can be written as unique functions of the moments (i.e. means, variances, or covariances) of the observed variables, the model is just-identified (Bollen and Noble, 2011). That is, the number of data variances and covariances equals the number of parameters. In this case, the estimated parameters perfectly reproduce the sample covariance matrix and the analysis is uninteresting because the model has zero degrees of freedom (df) and therefore can never be rejected (Byrne, 2010). The model is said to be over-identified if there are more data points (i.e. the number of non-redundant sample variances and covariances) than unknown parameters (Byrne, 2010). If there are fewer data points than parameters to be estimated, the model is under-identified and parameters cannot be estimated. Thus, the number of parameters needs to be reduced by fixing, constraining or deleting some of them. A parameter may be fixed by setting it at a specific value or constraining it. Empirical techniques for model identification are part of nearly all SEM software.

Identification in reflective latent constructs can be achieved by applying the "rule of three" suggested by Bollen (1989) where a single factor measurement model should have at least three indicators. A construct with three reflective measures allows for the covariances among the indicators to be used to estimate the factor loadings (Freeze and Raschke, 2007). In contrast, a necessary condition for identification of a formative construct is to emit more than one path (MacCallum and Browne, 1993).

Model estimation

Two classes of estimators are distinguished in SEM: the model-implied moment (MIM) and the model-implied instrumental variable (MIIV) estimators. MIM estimators, also known as full information estimators are the most common, with the Maximum Likelihood (ML) estimator being the most frequently employed. Relative strengths of full-information approaches are that they provide the most efficient parameter estimates (i.e. that best explain the observed

covariances) and an overall test of model fit (Joreskog and Wold, 1982; Anderson and Gerbing, 1988). However, one drawback of being a full information estimator is that, in the likely situation of structural misspecification, structural errors in one part of the model are likely to spread their effects to other parts even if these are properly specified (Bollen and Noble, 2011). The use of more robust estimators such as the MIIV estimators (e.g., MIIV two-stage least squares or MIIV-2SLS) can overcome the spread of some structural error in the model.

Model fit

Testing the model fit involves two aspects: (*i*) the component fit (convergent validity) which refers to testing the statistical significance of the individual parameter estimates (e.g., t-ratios) and (*ii*) the overall model fit where a researcher assesses how well the specified model accounted for the data based on a set of overall goodness-of-fit indices. "Fit indices are different ways of expressing the 'distance' between the sample covariance matrix and the estimated implied covariance matrix, i.e. they are functions of the residual matrix" (Blunch, 2008: 110). After estimating a model, fit statistics should be evaluated to check whether the hypothesised model is a fit for the data, or whether any modification is needed to improve the fit. Table 3.1 lists three ways to assess model fit, namely the absolute fit, the comparative fit and the parsimonious fit. Each type of fit statistic includes different indices and some rules of thumb about the required minimum value for good fit.

Table 3.1: Goodness of Fit Criteria and Acceptable Fit Interpretation
(Schumacker and Lomax, 1996)

Fit statistics	**Acceptable Level**	**Interpretation**
Absolute Fit		
Chi-square (χ^2)	Tabled χ^2 value	compare obtained χ^2 value with tabled value given d.f.
Goodness of Fit (GFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
Adjusted GFI (AGFI)	0 (no fit) to 1 (perfect fit)	Value adjusted for d.f. with 0.90 a good model fit
Root-Mean-Square Error Approximation (RMSEA)	<0.10	<0.10 reflects good fit <0.05 reflects very good fit <0.01 reflects outstanding fit
Normed Fit Index (NFI)	0 (no fit) to 1 (perfect fit)	Value above 0.90 reflects a good fit
Non-Normed Fit Index (NNFI)	0 (no fit) to 1 (perfect fit)	Value above 0.90 reflects a good fit

Fit statistics	Acceptable Level	Interpretation
Comparative Fit		
Comparative Fit Index (CFI)	0 (no fit) to 1 (perfect fit)	Value above 0.90 reflects a good fit
Incremental Fit Index (IFI)	0 (no fit) to 1 (perfect fit)	Value above 0.90 reflects a good fit
Relative Fit Index (RFI)	0 (no fit) to 1 (perfect fit)	Value above 0.90 reflects a good fit
Parsimonious Fit		
Parsimonious Goodness of Fit Index (PGFI)	0 (no fit) to 1 (perfect fit)	Compares values in alternative models
Parsimonious Normed Fit Index (PNFI)	0 (no fit) to 1 (perfect fit)	Compares values in alternative models

Most SEM scholars recommend evaluating the models by observing more than one fit index (Garver and Mentzer, 1999; Hair et al., 2006). Among the commonly reported indices in the literature are two absolute fit indices: χ^2_{df} and RMSEA, and three comparative fit indices: IFI, TLI, and CFI which have been found to be "the most insensitive to sample size, model misspecification and parameter estimates" (Hooper, Coughlan and Mullen, 2008: 56). These selected fit measures are detailed in the following and are evaluated in chapters 5 and 6 to assess the measurement model and the structural model used in this thesis.

The Chi-square

Chi-square "assesses the magnitude of the discrepancy between the sample and fitted covariances matrices" (Hu and Bentler, 1999: 2). As such, it indicates the difference between the expected and the observed covariance matrices. Smaller χ^2 values indicate better fit (i.e. smaller discrepancy). If the implied covariances (Σ) had been identical to the sample covariances (S), χ^2 would be 0. Since the implied covariances and the sample covariances are merely estimates, they cannot be expected to be identical. The probability value (usually $\alpha = .05$) associated with χ^2 represents the likelihood of obtaining a value that exceeds the χ^2 value when H_0 is true. The null hypothesis suggests that specifications of the parameters (i.e. factor loadings, factor variances, covariances, and error variances) of the model are valid. Thus, the higher the probability associated with χ^2, the closer the fit between the hypothesized model and the perfect fit (Bollen, 1989).

Chi-square is very sensitive to the sample size as well as to the complexity of the model (i.e. the number of estimated parameters). The more complex is the model, the larger χ^2 and so the more likely the specified model will be rejected when large samples are used (e.g., Bentler and Bonnet, 1980; Kenny and McCoach, 2003). Hair et al. (2006) affirm that as sample size gets large (>400), maximum likelihood χ^2 estimation becomes too sensitive which makes all goodness of fit tests indicate a poor fit. To overcome this issue, researchers have been using normalized chi-square: χ^2/df. Accordingly, χ^2/df between 1 and 2 indicates a very good model fit (Holmes-Smith, Coote and Cunningham, 2004; Byrne, 2010). There is no agreement regarding an acceptable ratio for this statistic, yet recommendations range from less than 2 (Tabachnick and Fidell, 2001; Ullman, 2001) to less than 5 (Wheaton et al, 1977; Schumacker and Lomax, 2004).

The Root Mean Square Error of Approximation

RMSEA has been recognised as the most informative criteria in covariance structure analysis (Byrne, 2010). Expressed per degree of freedom, it takes into account the error of approximation in the population (Byrne, 2010). As such, it is not affected by sample size but is sensitive to the number of the parameters to be estimated in the model. A value less than .05 indicates a good fit; and values as high as .08 represent reasonable errors of approximation in the population (Browne and Cudeck, 1993). Additionally, MacCallum, Browne and Sugawara (1996) elaborate that RMSEA values between .06 and .10 indicate mediocre fit, and values greater than 0.1 are considered a poor fit.

The Comparative Fit Indices

Each of the CFI, IFI and TLI provides measure of complete covariation in the data. CFI was first introduced by Bentler (1990) and is one of the most popularly reported fit indices due to being one of the measures least affected by sample size (Fan, Thompson and Wang, 1999). This statistic assumes that all latent variables are uncorrelated and compares the sample covariance matrix with the null model. Values for CFI, IFI and TLI range between 0 and 1 with values close to 0.95 being indicative of superior fit (Hu and Bentler, 1999).

Model Modification

When the component fit or overall model fit is not adequate enough, revisions that can range from minor (e.g., introducing a secondary path) to major (e.g., changing the number of latent variables and their relationships) should be made. The modifications should not be based solely on statistical significance; they rather should be theoretically justified (Anderson and Gerbing, 1988). In fact, consideration of both theory and content greatly reduces the number of alternate models to investigate as well as the possibility of taking advantage of sampling error to attain goodness of fit (Young, 1977; Anderson and Gerbing, 1988). Adding to the expertise of the researchers, modern SEM-packages offer powerful tools for evaluating how to modify the model using modification indices (MIs).

In sum, SEM procedures allow quantifying and testing theoretical relationships among latent and observed variables where the pattern of inter-relationships among the constructs studied are specified *a priori* and grounded in established theory (Hoe, 2008). SEM also provides tests of consistency and plausibility of the proposed model compared with the observed data. Additionally, it enables the analysis of direct as well as mediated relationships (Bollen and Noble, 2011). On the other hand, SEM procedures are particularly dependent on the knowledge and expertise of the researcher to avoid technical issues related to model misspecification. Model specification is the primary concern since the subsequent steps flow from model specification. That is, if the model is misspecified, it cannot reproduce the observed covariances adequately, and hence will not fit the data. Due to the importance of the specification procedure, the next section presents a detailed exposition on the types of measurement models.

3.3 The Types of Measurement Model in SEM

Constructs are of two types: reflective and formative. The same construct (i.e. trust) can be reflective or formative, as shown in Figure 3.1. While the measures of intention to purchase, intention to collaborate and intention to share information are consequences generated by the concept of trust in the reflective model; ability, benevolence and integrity are causes of trust in the formative model. The specification depends on the research objectives, as each model type leads to different implications as well as on the nature of the indicators considered (Ebert, 2009).

The purpose of this section is to provide a theoretical background to reflective versus formative specifications for the next section in which the SEM of the current research is developed.

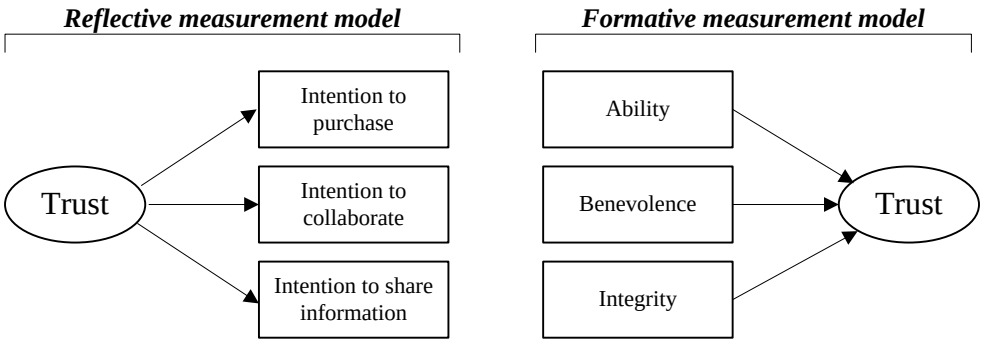

Figure 3.1 : Types of measurement model
(Söllner and Leimeister, 2010)

3.3.1 The Effect Indicator Model

In a reflective measurement model, the direction of causality (the direction of arrows) is from the construct to the indicators (Y_i) as illustrated in Figure 3.2 in which measurement errors e_i are represented at the individual measures. In this type of model, measures are answers to the construct consequences which are observable. According to Jarvis, MacKenzie and Podsakoff (2003), effect indicators are "manifestations" of the latent variable. In Figure 3.1, if a consumer trusts a brand, then he/she is likely to purchase that brand. That is, intention to purchase is an observable outcome of trust.

Indicators of a reflective construct should have internal consistency; that is reliable estimates that converge to the true parameter values of the model as the sample size goes to infinity. As such, the estimates are asymptotically unbiased and the usual ML estimator has the property of asymptotic consistency (Bollen, 2011). Furthermore, measures are interchangeable since they are assumed to be equally valid indicators of their purported construct (Jarvis, MacKenzie and Podsakoff, 2003). Thus, the construct validity is unchanged when one indicator is omitted because all facets of a construct should be adequately represented by the remaining indicators (Bollen and Lennox, 1991). The validity of a measure is defined as the "magnitude of the direct structural relation between the measure and the latent variable" (Bollen, 1989: 197). A measure is valid when its loading is large in a substantive sense and its estimate is statistically

significant. More effect indicators are generally better than fewer, yet which indicators are used is less important (Bollen, 2011).

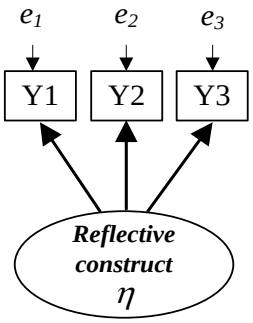

Figure 3.2: Effect indicator model
(Bollen and Lenox, 1991)

The model in Figure 3.2 is equivalent to a single factor model with three indicators and uncorrelated errors. The equations of the measurement model describing the hypothesized relation between the indicators and their latent variable are:

$$\begin{aligned} y_1 &= \alpha_1 + \lambda_1\eta + e_1 \\ y_2 &= \alpha_2 + \lambda_2\eta + e_2 \\ y_3 &= \alpha_3 + \lambda_3\eta + e_3 \end{aligned} \qquad (3.1)$$

where y_j is the j[th] effect indicator of η, α_j is the intercept in the measurement equation, λ_j is the factor loading or regression coefficient of the effect of the latent factor on y_j, η is the factor or latent variable to measure, and e_j is the error that contains all other influences on y_j besides η. It is assumed that $E(e_j) = 0,\ COV(e_i, e_j) = 0,\ COV(e_i, \eta) = 0$ for $i, j =$ 1, 2, 3 and $i \neq j$ (Bollen, 2007). To examine the validity of the measures, it is presumed that at least one of these three indicators, say y_1, is valid. That is, the factor η is scaled to this indicator by setting $\lambda_1 = 1$ and $\alpha_1 = 0$ leading to $y_1 = \eta + e_1$. Scaling the latent variable is sufficient to identify this model where it is possible to find unique values for the remaining intercepts, factor loadings, and other parameters (Bollen, 2011). Without scaling the latent variable, the model is under-identified. Finally, because effect indicators often depend on one latent variable, the collinearity issue is not prevalent.

Psychometric scales, including the measurements of personality traits, attitudes and intentions are based predominantly upon effect indicators (Ebert, 2009; Jarvis, MacKenzie and Podsakoff, 2003; Fayers et al., 1997). For instance, in a study assessing the general aspects of quality of life (QOL) such as anxiety, depression and tiredness on two groups (Norwegian and Danish) of cancer patients, empirical findings show that tiredness behaves as an effect indicator of the QOL (that is tiredness is a consequence of a poor QOL), whereas vomiting is a causal indicator of the latent construct (Fayers et al., 1997). Further detail on formative constructs and causal indicators is presented in the next section.

3.3.2 The Causal Indicator Model

Despite the increased attention to causal (formative) indicators for construct measurement in empirical studies, effect indicators are still dominant (Diamantopoulos, Riefler and Roth, 2008; Bollen, 2007). Furthermore, many researchers disagree on the distinction between causal and composite[2] (formative) indicators although they share many similarities (Bollen, 2011). Bollen (2007) recognizes that terminology is one difficulty of working with SEM: names of variables (e.g., indicators) are not used consistently in the literature. To avoid ambiguity between terms, formative and casual indicators are used interchangeably here and composite indicators are not considered due to their irrelevance in the context of this thesis.

In a causal measurement model, the direction of causality is from the indicators to the construct rather than the other way, as displayed in Figure 3.3 below. As such, measurement items (Y_i) cause the construct and changes in them are hypothesized to alter the meaning of the underlying factor. Therefore, the measures used in this type of model are referred to as causal (Bollen and Lennox, 1991).

[2] One difference between composite indicator model and causal indicator model is that the latent variable is error-free which means that the composite indicators completely determine the composite concept. It is very rare when a concept is an exact linear function of its indicators. See Bollen (2011) for more details on the difference between composite and causal indicators.

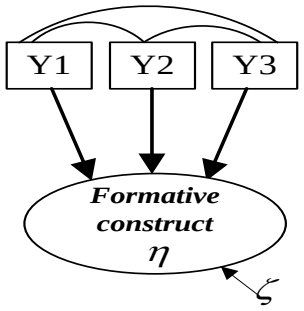

Figure 3.3: Causal indicator model
(Bollen and Lenox, 1991)

A causal indicator model does not assume or require that the formative measures are correlated, although some have hypothesized so (Ebert, 2009). This discord might also depend on the application itself. Furthermore, the disturbance term (zeta) in a causal measurement model is represented at the construct level and so the estimate is for the overall amount of random error in the set of indicators. It is the combined effect of all factors having an effect on the dependent variable, but not being explicitly included in the model (unlikely to be identified and so to be measured). Although this information allows evaluating the reliability of the scale and potentially improves the scale, it is somewhat less prescriptive about how the scale can be improved since the error is associated with the group of measures rather than individual measures (Jarvis, MacKenzie and Podsakoff, 2003).

The diagram of Figure 3.3 is equivalent to the following equation corresponding to causal indicators:

$$\eta = \alpha_{\eta} + \gamma_{\eta_1} x_1 + \gamma_{\eta_2} x_2 + \gamma_{\eta_3} x_3 + \varsigma \qquad (3.2)$$

Where α_j is the intercept, x_j is a causal indicator, $\gamma_{\eta j}$ is the coefficient of x_j and its effect on the latent variable η, and ζ is the disturbance with $E(\zeta)=0$, $COV(x_j,\zeta)=0$ and $COV(\zeta,\eta)=0$ for *i, j=1,2,3*. An important difference from the effect indicator model in equation (1) is that the causal indicator model in (2) is not identified. This means that without additional information, one cannot find unique values for the parameters in the model and hence cannot assess indicator validity. To overcome this issue, effect indicators should be added to the model (Bollen, 2011). As such, the model becomes a MIMIC (Multiple-Indicator Multiple-Cause) model when effect indicators are added (Jöreskog and Goldberger, 1975)

According to Jarvis, MacKenzie and Podsakoff (2003), indicators are not manifestations of the construct as in the reflective model but they are defining characteristics of it. For instance, Figure 3.1 posits that a strong (weak) ability or benevolence or integrity of a market actor will enhance (lower) consumer trust in that actor. Unlike the reflective model, "a change in the construct does not automatically imply a change in all indicators" (Jarvis, MacKenzie and Podsakoff, 2003: 201). For example, socio-economic status or SES is a typical formative construct caused by education, income and occupational prestige (e.g., Heise, 1972; Hauser, 1973; Crosby, Kenneth and Cowles, 1990, Chin, 1998). If an individual loses his/her job, the SES would be negatively affected. However, a negative change in an individual's SES does not imply that there was a job loss. On the other hand, a change in one indicator does not necessarily have an effect on the other indicators. For instance, Singh's (1988) latent construct called "consumer complaint behaviours" has indicators such as the likelihood of complaining to the store manager, telling friends and relatives about a bad service experience, reporting the company to a consumer agency, or pursuing legal action against the company. In this case, a high likelihood of a particular behaviour (say a complaint to a store manager about poor service) would influence the level of the latent construct, but would not necessarily affect the other measures. Another example is that an increase in income would increase SES even if there are no increases in education or occupational prestige.

In this sense, formative indicators are not compatible and thus they cannot be exchanged with each other as is possible with the reflective model. Since causal indicators help determine the latent variable, all indicators have to be considered in order to guarantee a comprehensive analysis of the examined construct. In other words, the group of measures jointly determine the conceptual and the empirical meaning of the construct. Therefore, dropping a single indicator can be critical in the sense that it may ignore a unique part of the formative construct and then may alter its meaning. By doing so, one may fail to provide a complete picture of the construct and could make the measure deficient by restricting the domain of the construct. The loss of an indicator might occur when measures exhibit low reliability, suggesting there is error in the measurement and the item is subject for elimination (Churchill, 1979). Decisions on whether to eliminate indicators must be based on the theoretical relevance of the indicator and its empirical performance in existing studies (Bollen, 2011).

In the consumer research area, formative measurement models can be applied to constructs such as beliefs (Ryan, 1982; Shimp and Kavas, 1984), emotions (e.g., Murray and Dacin, 1996), perceived risk (e.g., Srinivasan and Ratchford, 1991) and socioeconomic status. In marketing, adaptations made by customers (e.g., Hallén, Nazeem and Jan, 1991), satisfaction with channel partner (e.g., Mohr, Fisher and Nevin, 1996), sales performance (e.g., Cravens et al., 1993), and market orientation (e.g., Kohli, Jaworski and Kumar, 1993) are other examples of formative constructs.

Synthesis

Both reflective and formative measurement models help to capture unobservable constructs by specific combinations of measurement items. Yet, each model has its own specificities, as summarized in Table 3.2. In addition to these decision rules, Table 3.3 reproduces a set of guidelines proposed by Freeze and Rasche (2007) to assist researchers in building correct models. Having made a clear distinction between both types of models, the next section explains how these models apply to the constructs of confidence and trust involved in this thesis.

Table 3.2: Summary of the decision rules between reflective and formative models based on Jarvis, MacKenzie and Podsakoff (2003)

	Reflective model	***Formative model***
Causal priority	Direction of causality is from construct to indicators	Direction of causality is from indicators to construct
Measurement error	Error is represented at the individual item level	Disturbance is represented at the construct level
Measurement interchangeability	Indicators should be interchangeable and removal of an item does not alter the meaning of the construct	Indicators do need to be interchangeable and removal of an indicator does omit a part of the construct
Correlation	Indicators are expected to covary with each other	Not necessary for indicators to covary with each other
Internal consistency	Indicators should possess internal consistency	Internal consistency is not implied
Nomological validity	Nomological net for the indicators should not differ	Nomological net for the indicators may differ

Table 3.3: Guidelines for researchers (Freeze and Raschke, 2007)

Issue	***Researchers***
Misspecification	- Clearly define the construct to generate a set of measures that represent the construct domain - Pay careful attention to the directional relationship between the construct and measures - When using a construct from prior literature, the researcher should ensure that the theoretical reasoning of the construct is clearly defined as either formative or reflective
Identification	- For reflective models, careful consideration to the number of indicators is necessary (i.e. rule of three). - For formative models, two paths must emit from the measurement model. This is either done in isolation of the structural model or within the structural model.
Validation	- For reflective models, use classical test theory to validate the construct (Confirmatory Factor Analysis, convergent and discriminant validity, measurement reliability). - For formative models, use nomological validity methods. - Assess the strength of the path coefficient from the indicators to the construct. - Address any multicollinearity issues.

3.3 Proposed SEM for Consumer Confidence in Credence Attributes

3.3.1 The Structural Model

The structural or path model measures the relationship between constructs by showing potential causal dependencies between endogenous and exogenous variables. In chapter 2, trust in the food system and brand trust were hypothesized to determine consumer confidence in credence attributes. That is, the causality of confidence comes from trust, resulting in a certain repurchase intentions and brand loyalty. Furthermore, trust in the food system and brand trust, are predicted by perceived competence, credibility, benevolence and reputation. In other words, the causality of trust flows from these four antecedents. The direction of causality is already defined in the hypotheses. For instance, hypothesis 4 "*Perceived competence of the food system will positively influence trust in that food system"* means that perceived competence influences trust and any change in the level of competence will affect the level of trust in the food system. As such, consumer confidence in credence attributes, trust in the food system and brand trust are modelled in a formative way (each one emits at least two paths as displayed in Figure 3.4), with

confidence conceptualized as a mediator (i.e. confidence transmits the effect of trust to repurchase intentions and brand loyalty).

The path model comprises five endogenous variables (confidence, trust in the food system, brand trust, repurchase intentions and brand loyalty) and eight exogenous variables (perceived competence, credibility, benevolence and reputation of the food system; perceived competence, credibility, benevolence and reputation of a food brand). Correlations among endogenous variables are not imposed as they have fewer appropriate applications and are not recommended; otherwise they lead to interpretational confounding (Hair et al., 2006). Correlations can theoretically exist between exogenous indicators of the same type (i.e. reflective or formative). While reflective indicators need to be highly correlated with each other, representing a shared influence on the construct; high correlations between formative indicators suggests that measures refer to a similar aspect and therefore could be redundant (Söllner et al., 2010).

In the trust literature, the antecedents of trust are supposed to be separable and should cover different facets of trust (Mayer, Davis and Schoorman, 1995). In this thesis, trusting a producer (as a person or system) and trusting a brand (as a product) are distinct although they are expected to be related (Hypothesis 3). In addition, the four antecedents of trust including competence, credibility, benevolence and reputation cover different aspects related to food attributes. The competence of a food processor in terms of knowledge and expertise to provide a high quality product is one aspect of trust, and the benevolence to produce a brand in an environmentally-friendly manner is another aspect. Moreover, the antecedents of trust do not necessarily share the same indicators. For instance, the indicators of an actor's competence, which are knowledge and expertise, are different from the measures of an actor's credibility, which are transparency and honesty. In summary, the four antecedents of trust define and cause the construct. These causal relationships applied to confidence and trust form the structural component of the model displayed in Figure 3.4 below.

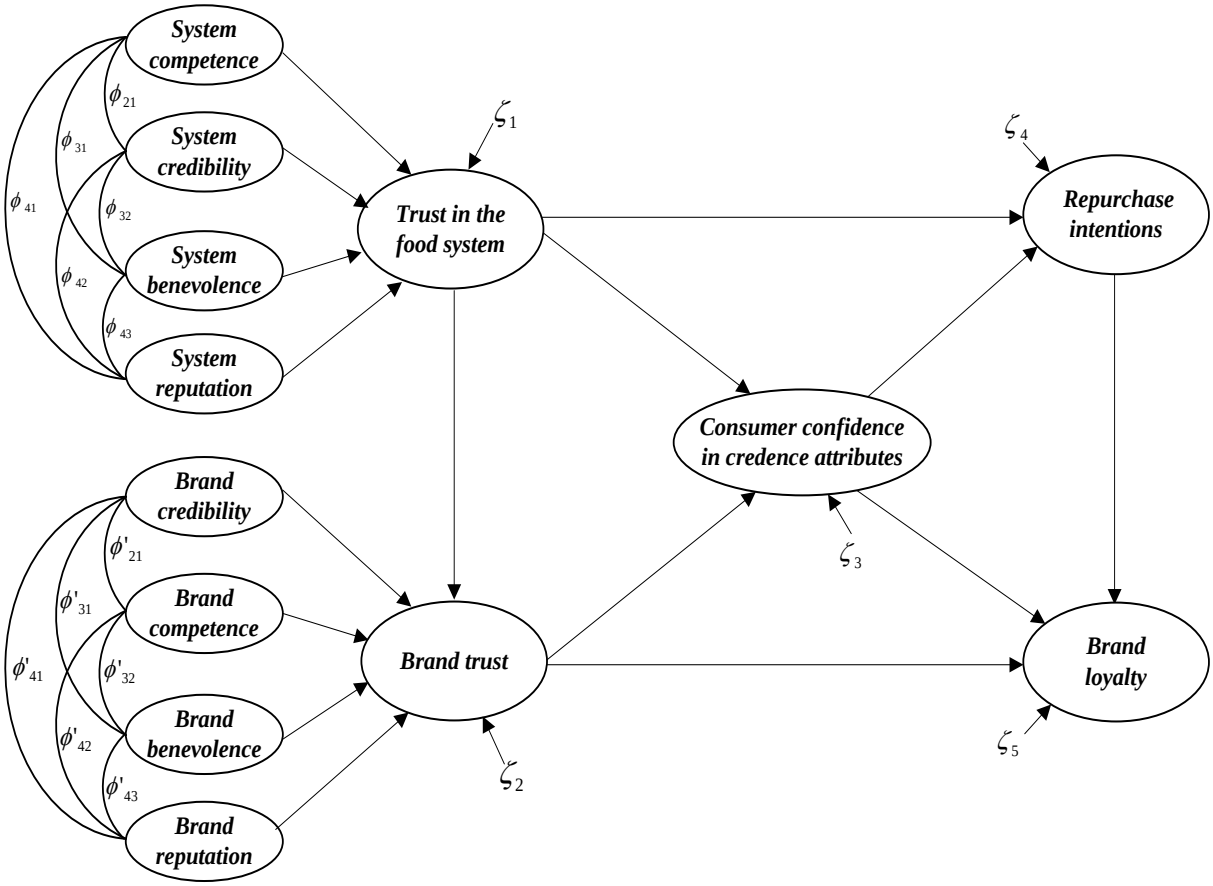

Figure 3.4: Path model for consumer confidence in credence attributes

The proposed theoretical model for consumer confidence in Figure 3.4 consists of three sub-models. The first sub-model predicts the relationships between consumer confidence in credence attributes, trust in the food system, brand trust, repurchase intentions and brand loyalty. The second sub-model measures the relationships between the trust in the food system and its proposed four drivers (perceived competence, credibility, benevolence and reputation). Likewise, the third sub-model maps the relationships between brand trust and its four antecedents. These paths are translated into a system of five structural equations as follows:

Table 3.4: Structural equations for endogenous variables

Endogenous variables	=	**Exogenous variables**				+	**Endogenous Variables**			+	**Error**
		X1	X2	X3	X4						
		Z1	Z2	Z3	Z4		Y1	Y2	Y3		
Y1		$b_{11} X_1 +$	$b_{21} X_2 +$	$b_{31} X_3 +$	$b_{41} X_4$						ζ_1
Y2		$b_{12} Z_1 +$	$b_{22} Z_2 +$	$b_{32} Z_3 +$	$b_{42} Z_4$	+	Y1				ζ_2
Y3							$b_{13} Y_1 +$	$b_{23} Y_2$			ζ_3
Y4							$b_{14} Y_1 +$	b_{24} Y3			ζ_4
Y5							$b_{15} Y_2 +$	$b_{25} Y_3 +$	$b_{35} Y_4$		ζ_5

where Y is a vector of endogenous variables, and Y1, Y2, Y3, Y4 and Y5 correspond to trust in the food system, brand trust, consumer confidence in credence attributes, repurchase intentions and brand loyalty, respectively. $\zeta_{i,\ i=1,2,3,4,5}$ are their respective error terms. The vectors X and Z represent exogenous variables (X1, X2, X3, X4; Z1, Z2, Z3 and Z4) corresponding to perceived competence, credibility, benevolence, and reputation dimensions of trust in the food system and of brand trust, respectively. Furthermore, these exogenous variables are correlated, as indicated by the arcs ϕ_i in Figure 3.4. All constructs in the path model are latent variables and thus they should be measured by effect indicators as detailed in the next section.

It is worth noting that not only does trust in the food system influence brand trust (cause), but brand trust could also influence trust in the food system (effect). That is, the relationship between trust in the system and brand trust could be bidirectional (e.g., in a longitudinal study that examines changes in these relationships in response to external shocks). Since a cause always precedes its effect, and to avoid issues related to reciprocal feedback loops within non-recursive models, the current model examines the causal relationship from trust in the food system to brand trust. Indeed, the necessary and sufficient conditions to identify models with reciprocal effects are complex (Bollen, 1989; Kline, 2011) and in practice acyclic (recursive) models are always identified (Rigdon, 1995; Blunch, 2001).

3.3.2 Measurement Model

The measurement model shows the relationship between a latent variable and its indicators, which are represented by a set of questions in a survey. The measures of the four antecedents of trust in the food system and brand trust are considered as manifestations of trust in the theoretical foundation (see sections 2.5.1 and 2.5.2), thus, they are specified reflectively in this study. That is, perceived credibility, competence, reputation and benevolence are considered as reflective constructs that account for observable variables. Furthermore, effect indicators are added to the other latent variables of the path model. This is an important step for model identification. As such, the factors in the path model have three reflective measures (rule of three) or two measures with uncorrelated errors. For instance, both outcome variables of the model (i.e. repurchase intentions and brand loyalty) are specified as reflective variables as is the case in previous research on trust (e.g., Sirdeshmukh, Singh and Sabol, 2002; Ebert, 2009).

Having multiple indicators for each construct in a measurement model is strongly advocated because they provide the most unambiguous assignment of meaning to the constructs (Anderson and Gerbing, 1982; 1988; Hunter and Gerbing, 1982). In fact with multiple-indicator measurement models, each estimated construct is defined by at least two measures, and each measure is intended as an estimate of only one construct (unidimensional measure).[3] On the other hand, when measurement models contain correlated measurement errors or have indicators that load on more than one factor, assignment of meaning to the estimated constructs can be problematic (Bagozzi, 1983; Fornell, 1983; Gerbing and Anderson, 1984).

Based on these insights, all measures for the different factors are set as unidimensional. That is, each construct in the model is assumed to be measured by its own indicators. For instance, measures of consumer confidence are different from those of system-based trust, which in turn are different from those of brand loyalty and repurchase intentions. Since each indicator loads only on one factor, the errors of the measured variables are uncorrelated.

The moderators (risk aversion, past experience and ethical involvement) are also modelled as reflective factors. A moderator variable specifies when or under what conditions a

[3] The most obvious difference between the measurement model and factor analysis is the lower number of loadings in the measurement model.

predictor (exogenous) variable influences a criterion (endogenous) variable (Baron and Kenny, 1986; Holmbeck, 1997). That is, moderators – which can be qualitative (e.g., gender, race, social status) or quantitative (e.g., level of reward) – may reduce or enhance the direction of the relationship between a predictor variable and a criterion variable. Since, moderators act as antecedents or exogenous variables, they do not correlate with either the predictor or the criterion variables (Ebert, 2009). Tests of moderation depend on the nature of the moderator. While discrete (categorical) moderator effects can be performed by multigroup analysis, continuous moderator variable effects can be performed by specifying interaction effects within the SEM (Sauer and Dick, 1993). The approach adopted to assess the moderation effects for this thesis is justified and developed in chapter 6 (section 6.3).

There is a large literature, in particular in the marketing and psychology disciplines, on the scale items of most constructs considered in this thesis. Nonetheless, only indicators viewed to be relevant to the food context are adopted. For example, measures used in online-shopping studies for electronic products may not apply to the food buying-decision process. As such, adjustments were made to the wording of existing scales to capture the context of food attributes. Measures used in this thesis are summarised in Table 3.5.

Table 3.5: Measurement instruments

Factors	***Item Explanation***	***Examples of Relevant literature***
Confidence	1. Certainty about the quality and safety of the food product 2. Optimism about the quality and safety of the food product 3. Knowledge about the quality and safety of the food product	Delgado-Ballester et al. (2003), De Jonge et al. (2008a)
Trust	1. Trustworthiness of the food system/Brand 2. Reliance on the food system/Brand	Lau & Lee (1999); McKnight, Choudhury & Kacmar (2002), Morgan & Hunt (1994)
System's competence	1. Knowledge of standards to provide high quality food 2. Expertise to guarantee high quality food 3. Monitoring/ Inspection (for the government)	Frewer et al. (1996); McKnight, Choudhury & Kacmar (2002); Romanowska (2009)
System's credibility	1. Transparency of food quality information 2. Truth telling about food safety issues	Frewer et al. (1996); McKnight, Choudhury & Kacmar (2002)

Factors	*Item Explanation*	*Examples of Relevant literature*
System's benevolence	1. Attention paid to the demand for high quality food 2. Care about consumer health more than profits 3. Adoption of socially and environmentally responsible practices	Frewer et al. (1996); McKnight, Choudhury & Kacmar (2002)
System's reputation	1. Consistency of past behaviour 2. Word-of-Mouth 3. System's image in the eyes of consumers	Maxham and Netemeyer (2002)
Brand's competence	1. Perception of the quality of the brand 2. Perception of the safety of the brand 3. Superiority of brands over generic versions	Lau and Lee (1999), Erdem and Swait (2004)
Brand's credibility	1. Transparency of food quality information 2. Accuracy of food safety information 3. High price of a brand linked to its high quality	Erdem and Swait (2004)
Brand's benevolence	1. Enhancement of consumer's welfare 2. Brand produced in a socially and environmentally responsible manner	Gurviez and Korchia (2002)
Brand's reputation	1. Consistency of brand quality and safety 2. Word-of-Mouth 3. Brand's image in the eyes of consumers	Lau and Lee (1999), Erdem and Swait (2004)
Risk Aversion	1. Reluctance to try new food products or brands 2. Risk tolerance 3. Anxiety toward food scandals	De Jonge et al. (2008a), Romanowska (2009)
Past experiences	1. Satisfaction with the product or brand 2. Product/Brand switch because of quality issues 3. Product/Brand switch because of safety issues	Delgado-Ballester et al. (2003)
Ethical involvement	1. Concern about animal welfare and purchasing behaviour of animal friendly products. 2. Concern about the environment and purchasing behaviour of eco-friendly products. 3. Concern about genetically modified food and purchasing behaviour of GM products. 4. Taking part in public or political action in order to improve the food.	De Jonge et al. (2008a), Romanowska (2009)
Repurchase intentions	1. Consideration of alternatives 2. Change in the purchasing behaviour after a food safety incident	Maxham and Netemeyer (2002), Erdem and Swait (2004), Harris and Goode (2010)
Brand loyalty	1. Keep purchasing the same product/brand 2. Seeking out the product/brand elsewhere when unavailable 3. Commitment to the product/brand	Raju (1980), Quester and Lim (2003)

Thus far, the full SEM of consumer confidence combining both structural and measurement components is displayed in Figure 3.5. The path model encompasses the hypothesised relationships between the constructs (ovals). The arrow between two factors represents the hypothesized causal effect (the path coefficient) from the factor at the arrow's end to that at the arrowhead. The measurement part connects each latent variable to its observed indicators represented by rectangles. The arrow between a rectangle and an oval represents the item loading (i.e. the variance explained by the factor for each observed item). Individual traits also encompass the socio-demographic characteristics drawn from the descriptive analysis of the population sample. More details on these characteristics and their effect on consumer confidence are provided in the empirical application detailed in the following chapters.

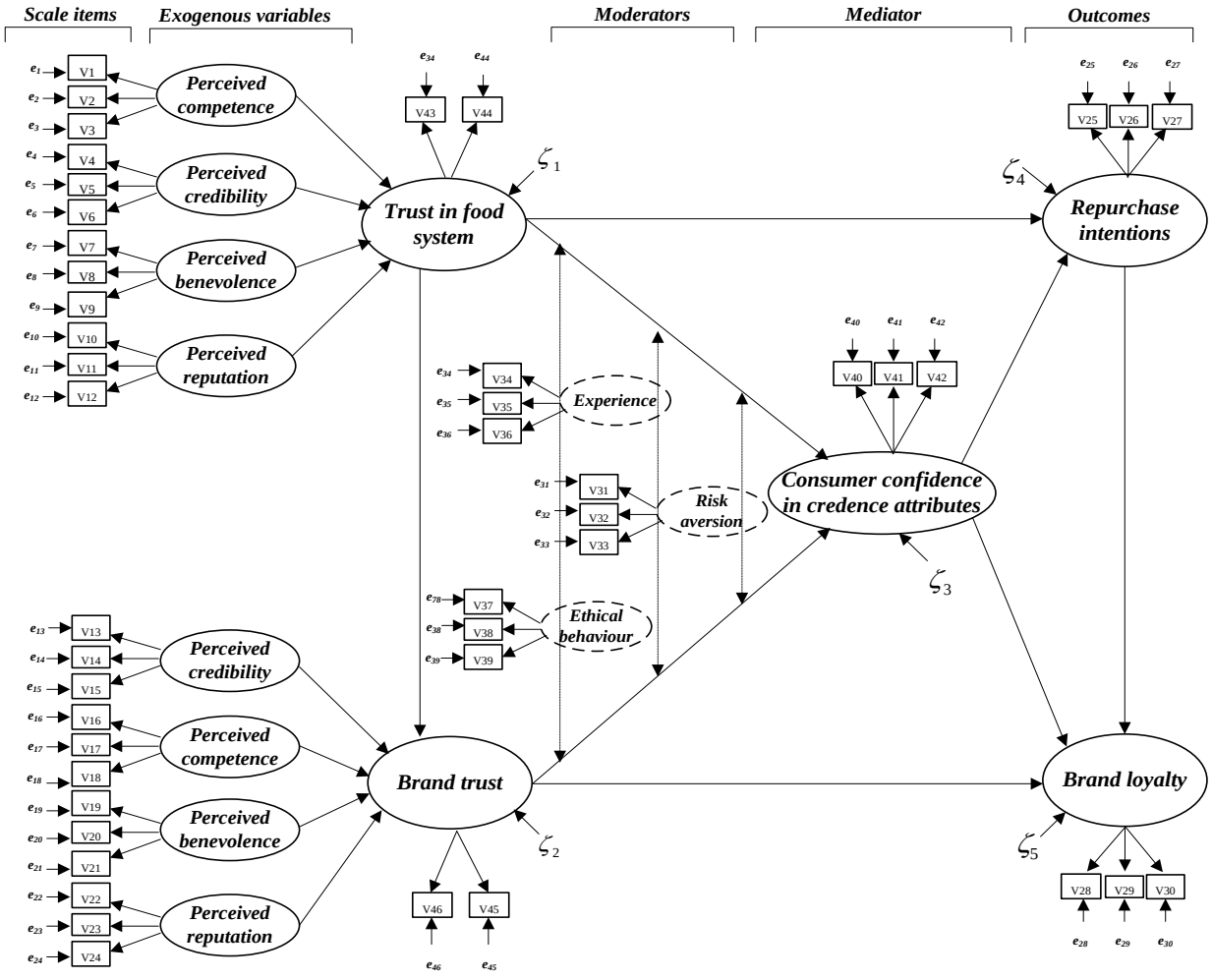

Figure 3.5: Proposed full SEM for consumer confidence in credence attributes

3.4 Conclusion

The goal of this chapter is to develop a conceptual model that explores how trust in the food system and in brands influence consumer confidence in credence attributes. To this end, the chapter specifies the nature of the constructs incorporated in the model since a failure to distinguish measurement levels may impair measurement accuracy and cause model misspecification. A central feature of this model is the inclusion of reflective measures of the antecedents and consequences of trust for twofold reasons. First, formative indicators cannot be empirically identified unless reflective measures are introduced in the model (MacCallum and Browne, 1993; Diamantopoulos and Winklhofer, 2001). Second, the inclusion of reflective measures allows testing the predictive validity of a multidimensional scale (Bagozzi, 1981).

The structural and the measurement parts can be estimated in two ways: simultaneously (one-step approach to SEM) or separately (two-step approach to SEM). The two-step approach to latent variable modelling was recommended initially by Anderson and Gerbing (1988), and subsequently by several researchers as the difficulties of using joint analysis of measurement and structural models have become more apparent (Fornell and Yi, 1992). There is much to be gained from a separate estimation of the measurement model and the structural model than from simultaneous estimation. One of these advantages is related to model fit. When the model fit is poor, one cannot detect whether the issue is in the measurement or in the structural part under the one-step approach. As such, it can sometimes be complicated to find out whether the structural model depicting the theory is wrong, or the bad fit is due to unreliable measurements (Blunch, 2008). This does not occur with the two-step approach. In fact, if the measurement model does not fit, the problem is obviously in step 1. Hence, it is meaningless to analyse the structural part of the model before revising the measurement component and addressing the unsatisfactory reliabilities. In addition to the goodness of fit, a two-step procedure focuses attention also on strength of the causal inference. Paths that are specified as absent and then are supported provide additional theoretical information and so potential for theory development (Anderson and Gerbing, 1988). Having developed the theoretical model and decided about the statistical methodology (i.e. the two-step strategy), the following chapters present an empirical application of the Structural Equation Model.

Chapter 4 – Research Methodology and Descriptive Data Analysis

4.1 Introduction

The overarching objectives of this thesis are to identify the factors that build consumer confidence in food safety and food quality, consumer trust in the food system and in brands. In chapter 2, a set of hypotheses were generated of which the underlying principles are: (*i*) perceived competence, credibility, benevolence and reputation that lead to consumer trust; (*ii*) individual factors moderate the relationship between trust and confidence; and (*iii*) repurchase intentions and brand loyalty are outcomes of consumer confidence in credence attributes. In chapter 3, a SEM is proposed and includes the significant factors leading to consumer confidence in credence qualities and shows their effects on repurchase intentions and brand loyalty. This chapter explains the research design used to test the postulated theoretical relationships. A survey is used to gather data on various elements of consumer perceptions of the food system and brands consistent with the features of the SEM. The chapter includes two sections: section 1 provides a description of the survey design for data collection, and section 2 provides a descriptive analysis of the survey sample population.

4.2 Research Methodology

This section explains the survey design, and justifies the sample size, as well as the products selected for the study. It explains how the data were collected and cleaned for the analysis.

4.2.1 Questionnaire Design

An online self-administered questionnaire is designed to gather data. A considerable advantage of the self-administered survey is the potential anonymity of the participant, which can lead to more truthful or valid responses. Furthermore, and unlike traditional survey methods, (mail, phone, face-to-face interview), electronic surveys have a number of advantages such as ease of respondent participation, cost-effectiveness, automated data collection that can be exported into various software formats, and response tracking (Rosenbaum and Lidz, 2007).

As requirements of the behavioural ethics research protocol, a consent form included as the first page of the questionnaire is used and is available in Appendices 1 and 2. It informs the respondents about the intent of the survey, their rights, the confidentiality and anonymity (the name and contact number of the lead researcher is provided if the participant wishes to verify the legitimacy of the survey or has specific questions) and the fact that the survey was approved by the University of Saskatchewan Behavioural Research Ethics Board (BEH# :11-311) on January 26 2012.

Two versions of the survey were used, focusing on fresh chicken meat and packaged green salad products. The rationale for selecting these products is provided in section 4.2.3. The purpose of the survey is to measure items for the causal factors hypothesized to affect consumer trust and confidence as summarized in Table 3.6. The questionnaire consists of four main sections. Section 1 includes a set of questions related to the theorized antecedents of trust in the food system. Section 2 includes a set of questions related to the postulated drivers for brand trust. Section 3 deals with a respondent's personal characteristics, and section 4 includes a set of questions related to repurchase intentions and brand loyalty.

A copy of the surveys is available in Appendices 1 and 2. Most of the questions are phrased as short statements on a five-point Likert scale. The five ordered response levels are: 1) *Strongly disagree*, 2) *Disagree*, 3) *Neutral*, 4) *Agree*, and 5) *Strongly agree*. A "Prefer not to say" was added as a 6^{th} option in order to not force the respondents to give an answer. This was done to ensure good quality data by avoiding biased results from forced choices. Question 2 includes three measurement items gauging the construct of "confidence" as shown in Table 4.1. Questions 3, 4, 5, and 6 are statements on trust and its four dimensions with respect to the government (Table 4.2), food manufacturers, food retailers and farmers, respectively. Similarly, question 9 features brand trust and its antecedents (Table 4.3).

Table 4.1: Measurement items for consumer confidence in credence attributes

Factor	***Item***	***Explanation (Anchors: Strongly agree/Strongly disagree)***
Confidence [Confid]	Confid1	How certain are you about the quality and safety of the product you buy?
	Confid2	How optimistic are you with the overall quality of the product you will buy in the future?
	Confid3	How knowledgeable do you consider yourself about the overall quality of the product you buy?

Table 4.2: Measurement items for government trust and its dimensions

Factor	*Item*	*Explanation (Anchors: Strongly disagree/Strongly agree)*
Trust [Gtrust]	Gtrust1	I think that government can be trusted to assure products of high quality.
	Gtrust2	I can rely on government to assure products of high quality.
Competence [Gcomp]	Gcomp1	I think that government has sufficient knowledge to guarantee high quality product.
	Gcomp2	I think that government has the expertise to control the quality.
	Gcomp3	I think that government is doing regular inspection and monitoring.
Credibility [Gcred]	Gcred1	I think that government provides transparent information.
	Gcred2	I think that government tells the truth about food safety.
Benevolence [Gbene]	Gbene1	I think that government pays attention to consumers' demand for high quality.
	Gbene2	I think that government views the health of consumers as being more important than the profits of producers.
	Gbene3	I think that government encourages producers to adopt socially and environmentally responsible practices.
Reputation [Grepu]	Grepu1	I think that government can be relied upon to act consistently in responding to food safety incidents.
	Grepu2	I hear positive comments about governmental efforts to improve the overall quality of food.
	Grepu3	In general, I have a positive view of the government.

Table 4.3: Measurement items for brand trust and its dimensions: Chicken

Factor	*Item*	*Explanation (Anchors: Strongly disagree/Strongly agree)*
Trust [Btrust]	Btrust1	I think that the chicken brand I buy can be trusted for its high quality.
	Btrust2	I think that the chicken brand I buy has reliable quality.
Competence [Bcomp]	Bcomp1	I believe that the chicken brand I buy is of high quality.
	Bcomp2	I believe that the chicken brand I buy is safe to eat.
	Bcomp3	I believe that the chicken brand I buy is better than a generic version.
Credibility [Bcred]	Bcred1	I believe that the chicken brand I buy has transparent quality information.
	Bcred2	I believe that the label of the chicken brand I buy has accurate safety information.
	Bcred3	I think the reason brands are usually more expensive than generic versions is their higher quality.
Benevolence [Bbene]	Bbene1	I think that the chicken brand I buy enhances my well-being in terms of nutrition and health.
	Bbene2	I think that the chicken brand I buy is produced in a socially and environmentally responsible manner.
Reputation [Brepu]	Brepu1	I think that the chicken brand I buy has consistent overall quality.
	Brepu2	I hear positive comments about the chicken brand I buy from my family and my friends.
	Brepu3	In general, I have a positive view of food brands.

Questions 10, 11 and 12 were devoted to the moderator variables presented in Table 4.4. Three measurement items were used to scale risk aversion, three items to gauge past experience, and seven items to measure ethical involvement (3 measures for ethically-motivated intentions and 4 for ethically-motivated behaviour). Questions 13 and 14 formulate statements on consumers' repurchasing intentions (2 items) and brand loyalty (3 items) as displayed in Table 4.5. Finally, the survey gathers socio-demographic information to position the sample within the Canadian population.

Table 4.4: Measurement items for the personal factors

Factor	***Item***	***Explanation (Anchors: Strongly agree/Strongly disagree)***
Risk aversion [Risk]	risk1	I am reluctant to try new food products or brands.
	risk2	I think that food products have an acceptable level of risk (that is little risk). *[reverse coded]*
	risk3	When a food safety incident is in the news, it makes me anxious.
Experience [Expe]	exp1	I am very happy with the chicken product or brand I buy. *[reverse coded]*
	exp2	I have switched away from a chicken product or a brand because I was unhappy with the quality.
	exp3	I have switched away from a chicken product or a brand because I thought it was not safe to eat.
Ethical involvement [Invol]	invol1	I feel strongly about animal welfare.
	invol2	I feel strongly about the environment such as the use of chemicals in agriculture.
	invol3	I am concerned about genetically modified food products.
	invol4	I purchase animal friendly products whenever I can.
	invol5	I purchase eco-friendly products whenever I can.
	invol6	I avoid purchasing genetically modified food products whenever I can.
	invol7	I have taken an active part in public or political actions in order to improve the food.

Table 4.5: Measurement items for the repurchase intentions and brand/product loyalty: Chicken

Factor	***Item***	***Explanation (Anchors: Strongly agree/Strongly disagree)***
Repurchase intentions [Purchas]	purch1	I check the prices of other available chicken before buying the same product or brand.
	purch2	Suppose the media reported the presence of salmonella in the chicken you buy regularly. How likely are you to avoid purchasing that product or brand completely for some time after the story has left the news?
Brand loyalty [Loyalty]	loyal1	As long as I am satisfied, I will usually stick with purchasing the same chicken brand or product.
	loyal2	When the chicken product or brand I usually buy is not available in my usual shopping store, I go and look for it in another store.
	loyal3	When another chicken product or brand is having a sale, I generally buy it instead of my usual product or brand. [reverse coded]

4.2.2 Sample Size

Selecting an appropriate sample size is of a great importance, in particular, for practical and statistical significance. Indeed, a number of scholars (e.g., Jöreskog, 1974; Bentler and Bonnett, 1980) posit that ratio statistics are directly dependent on sample size. In large samples, significant values can be obtained even with trivial discrepancies between a model and the data (Anderson and Gerbing, 1988).

Methods for assessing adequate sample size requirements remain an issue in SEM studies. In fact, "research to date has not yet yielded a sample size formula suitable for SEM" (Westland, 2010: 476). Besides, recommendations on the literature regarding the sample size are sometimes in sharp contrast. While some scholars argue that a minimum sample size should be dependent on the number of estimated parameters, as suggested by the rules of thumb (e.g., Tanaka, 1984; Browne and Cudeck, 1993; Geweke and Singleton, 1980), others disagree with these rules positing a minimum sample size as a function of indicators (Boomsma, 1982; Velicer and Fava, 1987, 1989; Marsh and Bailey, 1991). Instead, they suggest that the ratio $(r = p/k)$ of indicators (p) to latent variables (k) is a substantially better way to calculate sample size. Simulations by Boomsma (1982) and Marsh et al. (1998) suggest that a ratio of $r = 4$ would require a sample size of at least 100 for adequate analysis, $r = 3$ would require a sample size of at least 200, and $r = 2$ would require a sample size of at least 400. By consolidating these results, Westland (2010) proposes the following formula: $n \geq 50\ r^2 - 450\ r + 1100$, where *r* is the ratio of indicators to latent variables, and *n* the minimum sample size.

Applying Westland's formula to the current model yields a minimum sample size of 200[4] which is proposed as the critical sample size for model structure in SEM based studies (Hair et al., 2006). Since there was a chance to afford a larger sample with the current thesis, a quota of 1000 was selected and equally allocated to two different products used in the survey, yielding a target sub-sample of 500 respondents per survey. The next section provides details about both food products selected for this thesis.

[4] $k = 16, p = 47, r = p/k \Rightarrow r = 3$ (16 factors and 45 items in table 3.6)

4.2.3 Products Used in the Survey

Fresh chicken meat and green packaged salad were selected as the products used in two versions of the survey for a number of reasons. First, the choice is motivated by the recent well-publicized food safety incidents regarding chicken and salad products (e.g., the widespread recall of bagged spinach in 2008). For instance, two brands of bagged salad (*Fresh Express* and *Dole)* were recalled in the U.S. and Canada due to contamination with E. coli in 2012. Increased differentiation of fresh chicken (fat-free, antibiotic-free, vegetable fed, cage-free raised, etc.) and packaged salad is another motivation for choosing these two product categories. Furthermore, the market for fresh chicken products in Canada has exhibited considerable expansion in branding in both retailers' and processors' brands. For instance, *Maple Leaf* and *Lilydale* (a major western Canadian chicken processor) have been aggressively adopting a branding strategy for fresh chicken (*Maple Leaf Prime*, *Lilydale Gold*) (Goddard et al., 2007).

The increased consumption of chicken and packaged salad is another motivation. In fact, chicken is currently an important source of protein in Canada of which consumption has doubled during the last three of decades, from 16.88 kg per capita in 1980 to 31.22 kg in 2011 (AAFC, 2012). Canadian consumer preferences for chicken may be attributed to nutritional concerns about the levels of fat and cholesterol in red meats like beef and pork, of which consumption has been declining (Goddard et al., 2007). In a 2012 survey commissioned by the Alberta Livestock and Meat agency, it was found that 44% and 35% of respondents in Canada (N=1341) are eating less beef and less pork, respectively, compared to 5 years ago, while 66% and 45% say they are eating more fish and chicken, respectively (ALMA, 2012).

The increasing demand for healthier food choices and the shift away from processed food toward fresh food and food perceived as "natural", is another driving force for focusing on fresh salad. In fact, bagged salads were identified as a high growth grocery category in Canada (ACNielsen, 2003). A five year review of data from ACNielsen (2003) shows that Canadians are increasingly purchasing refrigerated bagged salads and it is likely this trend has continued over the past ten years. Adding to their convenience, salad greens are offered under many varieties and colours (e.g. leaf lettuce, beet greens, spinach leaves, radicchio, rapini, endive, arugula). While technological advances in packaging prolong shelf life, salad packaging offers the opportunity for branding and displaying claims such as "*Fresh"* and "*Organic"*.

In both the chicken and salad surveys, questions related to private labels and national brands covered major brands at large supermarket chains in Canada. The store brands covered in this study are from the four top Canadian food retailers by total food store sales, namely: Loblaws Cos. Ltd ($31,603 million), Sobeys Inc. ($15,723 million), Metro Inc. ($11,408 million) and Canada Safeway ($6,737 million) (Roukhkian and Bardouniotis, 2011). The availability of both types of brands at a national level was important to allow the survey to be administered across Canada. Not only is there a potential for different consumer perceptions about a fresh meat product versus a bagged salad product, but also selecting two different products will allow testing the model across different product groupings. Different results may suggest that confidence in food varies across product categories.

At the start of each survey, a definition of the product in question was provided to ensure that participants understood the product of interest for the study. Both definitions are below:

Chicken survey: In this survey, chicken refers to RAW, fresh whole chicken and chicken cuts or pieces (drumsticks, wings, breast, etc.) that are refrigerated in the store and have never been frozen. In this survey, the term fresh chicken meat does **not** refer to processed products made of chicken meat including ground chicken and cooked deli products.

Salad survey: In this survey, the use of the term "salad" refers to packaged, green fresh salad or garden salad most often composed of a variety of leaves, including several kinds of lettuce, Arugula, Mesclun (or spring mix), endive and spinach. The packaged salad is usually sold in a plastic bag or a box.

4.2.4 Test and Data Collection

Once a draft questionnaire (in English) was developed, a pilot study was conducted in February 2012 in Montreal and in March 2012 in Saskatoon. About twenty respondents completed the pilot survey. This test aimed at refining the wording of the questions before the official launch in order to minimize measurement errors caused by poor wording and improper structure. After finalizing the survey in French and in English, *Insightrix* – a professional marketing research company based in Saskatoon – was commissioned to administer the data collection. The formal survey was launched in July 2012 as a web questionnaire. Respondents were recruited from across Canada from consumer survey panels operated by the market

research company. Participants were assigned a unique identification code by the research firm to ensure anonymity, and to ensure that each respondent completed the survey only once. Regional quotas were included to be representative of the geographic distribution of the Canadian population. The survey was kept open until the target sample size was reached. The chicken and salad survey were emailed to 1207 and 1250 individuals, respectively. A total of 529 completed questionnaires were returned for each of the chicken and salad surveys, a 43 % response rate.

A number of procedures were implemented to control for the quality of the survey data. For example, a screener question was used to exclude participants who did not purchase the product: "Do you purchase fresh chicken meat?" for the chicken survey, and "Do you purchase packaged salad greens?" for the salad survey. Participants answering "No" did not proceed with the questionnaire. Furthermore, when programming the survey, the order of questions was randomized in order to avoid an ordering effect in the agreement statements. As well, "trap" questions were inserted in the middle of the set of questions. A trap question (say question *f*) is an identical repeat of an earlier question (say question *b*) to check whether a respondent's answers are consistent. This enables responses from participants who were answering inconsistently to be weeded out. The data were also cleaned by removing the respondents who selected the option "Prefer not say". A total of 461 (a 38% response rate) and 465 (a 37% response rate) usable questionnaires for the chicken survey and salad survey respectively was retained for the final dataset and is described in the section below.

4.3 Descriptive Data Analysis

This section provides a descriptive analysis of the survey sample population. A first sub-section compares and contrasts the demographic characteristics of the sample with the national population. Then, the purchase habits in terms of frequency of purchasing chicken and salad products and the most frequently purchased brands are described. Finally, some information on personal attitudes including risk aversion, ethical involvement and past consumption experiences are summarized.

4.3.1 Sample Socio-demographics

The distribution of the general population sample by gender, age, geographic location, number of children in the household, education and income relative to the Canadian population is presented below.

- **Gender**

For both surveys, the respondents included about 40% men and 60% women, as depicted in Figure 4.1. Table 4.6 compares the sample to the Canadian population. Results demonstrate that women were slightly over represented in the salad sample at 60.86% compared with 51% in the Canadian population. This is to be expected given the screener question and the traditional dominance of female food shoppers. In a recent study commissioned by the Private Label Manufacturers Association (PLMA), GfK Custom Research North America finds that women dominate the retail marketplace, with two-thirds of them in the study saying they still handle much of the grocery shopping (PLMA report, 2013).

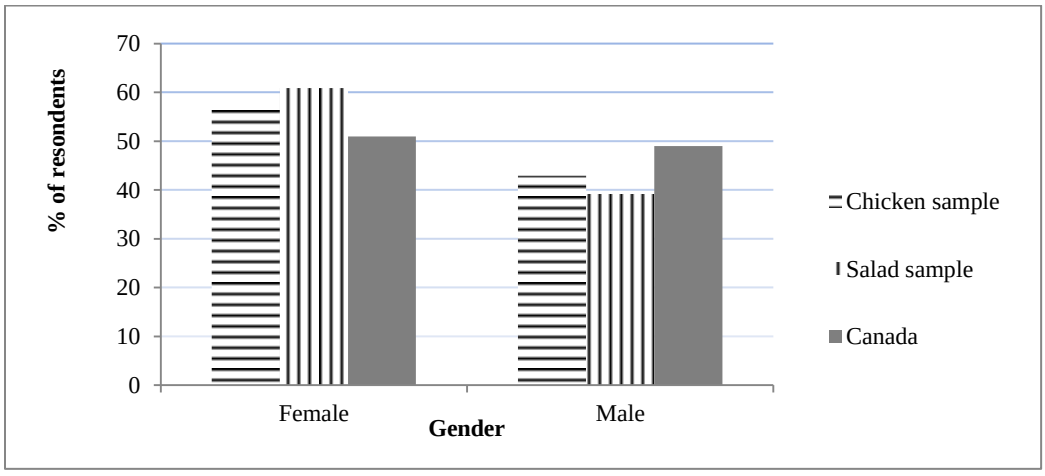

Figure 4.1: Gender of respondents compared to the Canadian population

Table 4.6: Gender of respondents compared to the Canadian population
Source**:** Author's own calculations based on survey dataset and Statistics Canada (2011a)

Gender	**Chicken survey**		**Salad survey**		**Canadian population (% - 2011 Census)**
	Respondents	**%**	Respondents	**%**	
Female	262	57.08	283	60.86	51
Male	199	42.92	182	39.14	49
Total	461	100	465	100	100

- **Age**

Except for seniors (aged 65 and over) who accounted for 18.61% of the population in Canada in 2011 (Statistics Canada, 2011a), Figure 4.2 shows that both samples are closely representative of the national population with respect to age. The "25-34", "35-44" and "45-54" age groups each represent about 20%.

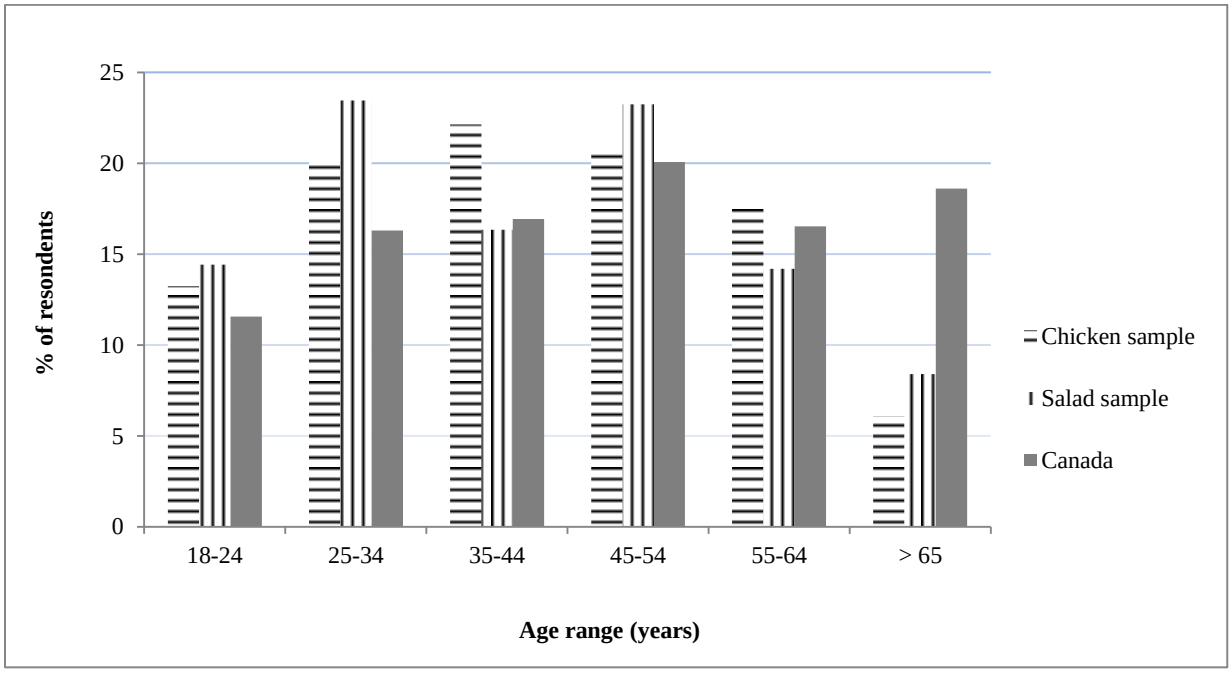

Figure 4.2: Age ranges of respondents compared to the Canadian population

Table 4.7: Gender of respondents compared to the Canadian population
Source: Author's own calculations based on dataset and Statistics Canada (2011a)

	Chicken survey		**Salad survey**		**Canadian Population** [a] **(% - 2011 Census)**
Age range	Respondents	%	Respondents	%	
18-24	61	13.23	67	14.41	11.57
25-34	93	20.17	109	23.44	16.30
35-44	102	22.13	76	16.34	16.93
45-54	95	20.61	108	23.23	20.07
55-64	82	17.79	66	14.19	16.53
> 65	28	6.07	39	8.39	18.61
Total	461	100	465	100	100

[a]: Canadians 18+

- **Geographical distribution**

The percentage breakdown of the two samples by province and territory is displayed in Figure 4.3. Participants in both surveys are reasonably well distributed geographically in proportion to their share of the national population. The largest proportions were from Ontario, 38% and Quebec, 25%. Respondents from the prairies represented about 18%, and those from British Columbia 13%. There were no respondents from Yukon or Nunavut; however this is not a serious concern as their combined population represents only 0.2 % of the Canadian population (Statistics Canada, 2011b).

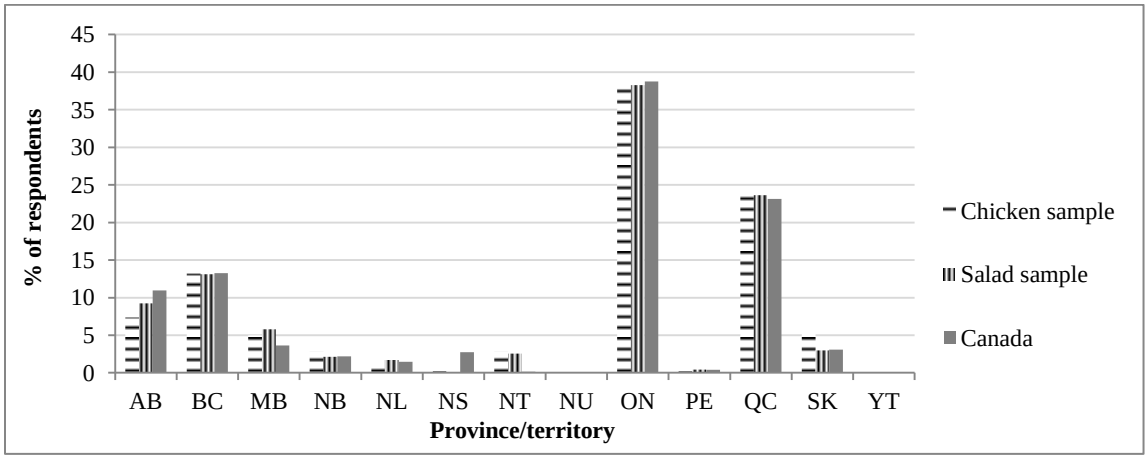

Figure 4.3: Geographical distribution of respondents compared to the Canadian population

Table 4.8: Geographical distribution of respondents compared to the Canadian population
Source**:** Author's own calculations based on dataset and Statistics Canada (2011b)

Province or territory	**Chicken survey**		**Salad survey**		**Canadian Population (% - 2011 Census)**
	Respondents	%	Respondents	%	
AB	34	7.38	43	9.25	10.96
BC	61	13.23	61	13.12	13.26
MB	23	4.99	27	5.81	3.63
NB	13	2.82	10	2.15	2.19
NL	3	0.65	8	1.72	1.48
NS	1	0.22	0	0.00	2.74
NT	13	2.81	12	2.58	0.13
NU	0	0	0	0.00	0.10
ON	176	38.18	178	38.28	38.78
PEI	1	0.22	2	0.43	0.42
QC	111	24.08	110	23.66	23.14
SK	25	5.42	14	3.01	3.07
YT	0	0	0	0.00	0.10
Total	461	100	465	100	100

- **Household size**

Participants were asked: "How many children younger than 18 live in your house?" Figure 4.4 shows that over 60% of the participants of both samples have no children. These participants can be either single or married without children. Since the last column of Table 4.9 is based on census of families with children at home, one cannot affirm that respondents with no children are overrepresented compared to the Canadian population (38%). Nonetheless, the proportions of respondents with one child and more in the sample are underrepresented compared to the national population.

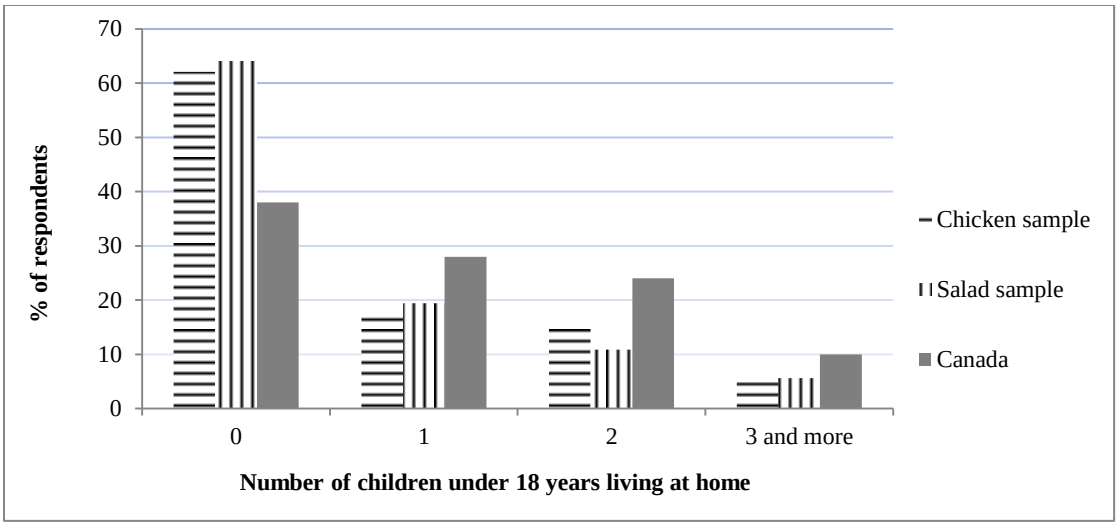

Figure 4.4: Number of households by number of children in population sample compared to the Canadian population

Table 4.9: Number of households with children in the population sample compared to the Canadian population
Source: Author's own calculations based on dataset and Statistics Canada (2006a)

Number of children	**Chicken survey**		**Salad survey**		**Families by number of children at home (% - 2006 Census)**
	Respondents	%	Respondents	%	%
0	286	62.04	299	64.09	38
1	82	17.79	91	19.42	28
2	70	15.18	50	10.86	24
3 and more	23	4.99	25	5.64	10
Total	461	100	465	100	100

- **Education**

Between 1999 and 2009, the proportion of Canadians aged 25 to 64 with tertiary education (i.e. college and university education) increased from 39% to 50% (Statistics Canada, 2012). Figure 4.5 shows that more than half of both survey samples have post-secondary education (combination of Technical/College /University and Grad studies) which is higher than the Canadian population in general, which is to be expected with an Internet-based survey. For instance, about 65% of respondents in the chicken sample have a post-secondary education compared with 47.42% in the Canadian population (Statistics Canada, 2006b).

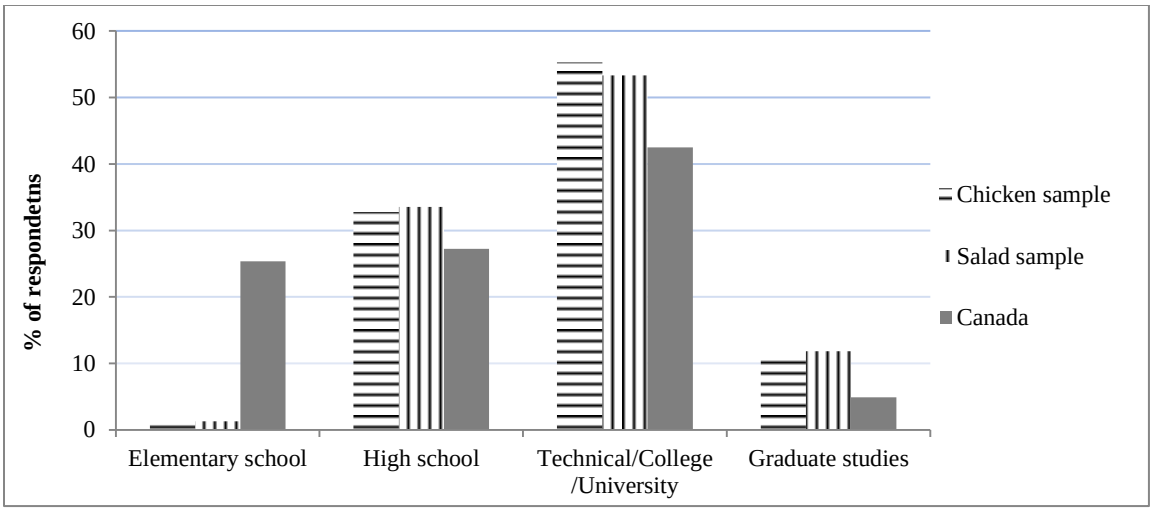

Figure 4.5: Education level of respondents compared to the Canadian population

Table 4.10: Education level of population sample
Source**:** Author's own calculations based on dataset and on Statistics Canada (2006b)

Education level	**Chicken survey**		**Salad survey**		**Canadian Population (% - 2006 Census)**
	Respondents	%	Respondents	%	
Elementary school	5	1.09	6	1.29	25.35[a]
High school	151	32.75	156	33.55	27.24
Technical/College /University	255	55.31	248	53.33	42.51[b]
Graduate studies	50	10.85	55	11.83	4.91[c]
Total	461	100	465	100	100

[a] No certificate, diploma or degree
[b] Includes apprenticeship, trades, college and university certificate or diploma or degree
[c] Includes earned doctorate, master's degree and degree in medicine, dentistry, veterinary medicine or optometry.

- **Income**

The breakdown by income displayed in Figure 4.6 shows that the sample data slightly over represents higher-income individuals and considerably under-represents the lowest income category, which as indicated, is to be expected with an internet survey.

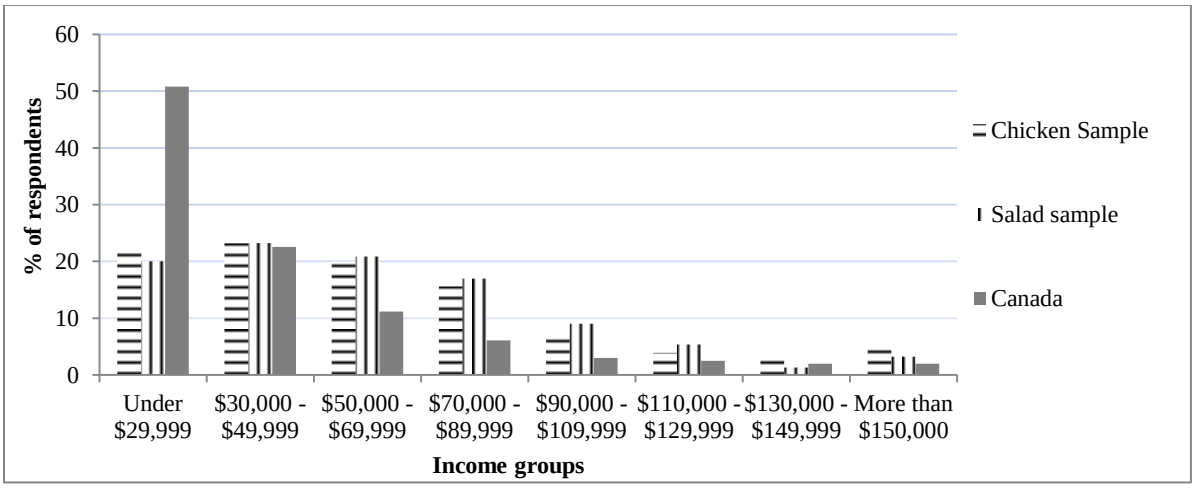

Figure 4.6: Annual income of respondents compared to the Canadian population

Table 4.11: Annual income of respondents compared to the Canadian population
Source**:** Author's own calculations based on dataset and Statistics Canada (2010)

Income groups	**Chicken survey**		**Salad survey**		**Canadian Population (% - 2010 Census)**
	Respondents	%	Respondents	%	
Under $29,999	100	21.68	93	20.00	50.78
$30,000 - $49,999	107	23.21	108	23.23	22.55
$50,000 - $69,999	92	19.96	97	20.86	11.20
$70,000 - $89,999	72	15.62	79	16.99	6.10
$90,000 - $109,999	34	7.38	42	9.03	3
$110,000 - $129,999	18	3.9	25	5.38	2.5
$130,000 - $149,999	17	3.69	6	1.29	2
More than $150,000	21	4.56	15	3.23	1.99
Total	461	100	465	100	100

In sum, both samples are reasonably representative of the Canadian population in terms of gender, age and geographic location, yet slightly biased toward higher income and better educated respondents, as expected.

4.3.2 Purchase habits

This thesis focuses on the factors that lead consumers to trust food, and in particular, the role of brands as quality signals. The frequency with which respondents purchased fresh chicken meat and packaged salad, the purchase of generic versus branded products, and which brands are most frequently purchased are described below.

➢ **Frequency of purchasing fresh chicken and packaged salad**

Respondents were asked how often they buy fresh chicken and packaged salad for home consumption at different types of stores including supermarkets, small grocery stores, speciality food stores and farmers' markets. Figures 4.7 and 4.8 display the results. Most participants buy their chicken and packaged salad from supermarkets once a week (37%) or every couple of weeks (25%). Supermarkets clearly dominate as the most frequently used store for both types of products, while purchases once a week, followed by every two weeks were most common for both fresh chicken and packaged salad. The current findings on the purchase frequency for chicken are consistent with those of the ALMA study (2012).

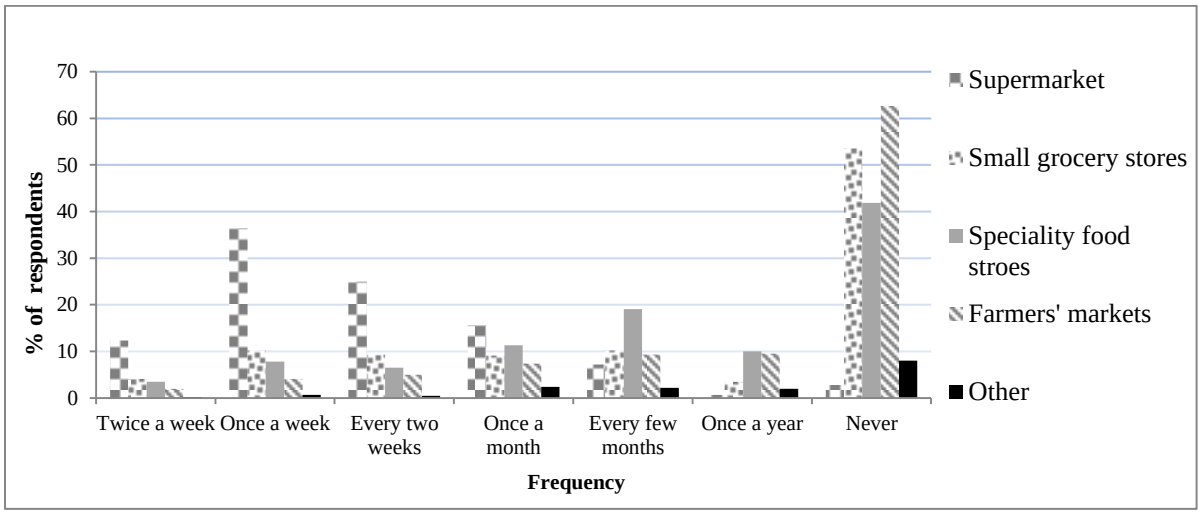

Figure 4.7: Purchase frequency of fresh chicken from different stores

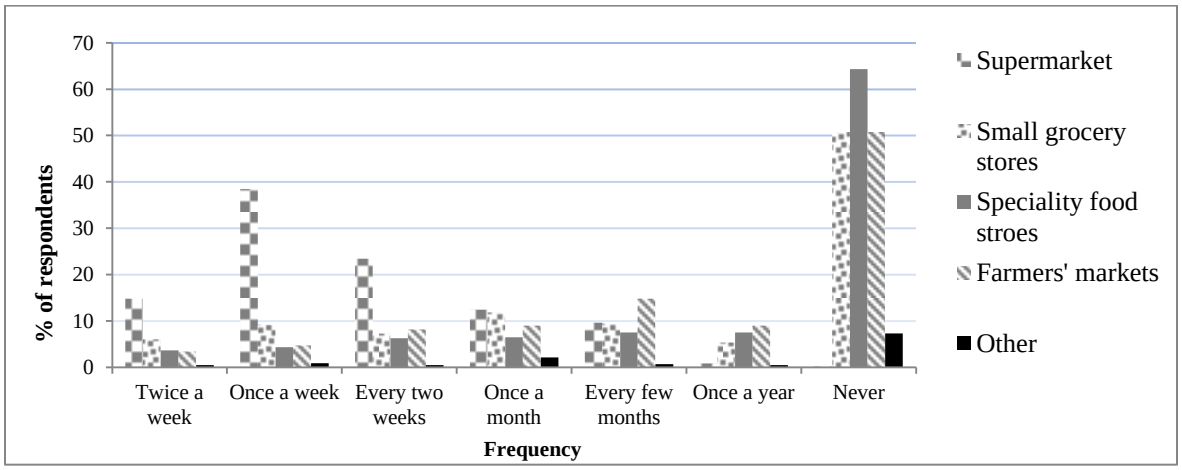

Figure 4.8: Purchase frequency of packaged salad from different stores

- **Purchase of branded versus generic products**

Respondents were asked whether they usually buy a generic chicken/salad product or a specific brand. Generic product (i.e. fresh chicken or packaged salad) means a product sold under no brand name. The label on the pack usually has the store name, pack date, weight, price and the bar code but no brand logo or image. Participants, who selected specific brand, were asked to select one and only one (most often purchased) brand. Brands include national brands such as *Maple Leaf* and *Lilydale* for chicken, and *Dole* and *Fresh Express* for salad, as well as retailer private labels such as *President's Choice*, *Safeway* and *Compliments*.

Figures 4.9 and 4.10 show that participants have distinctly opposite purchasing habits in each sample: while 70% of respondents buy generic products in the chicken sample, only 33% buy generic salad, with the remaining 67% buying branded packaged salad. Indeed, most of the bagged greens are available under branded names. On the other hand, the majority of consumers purchase generic rather than branded chicken meat. These proportions are not surprising as an estimated 94% of Canadian fresh chicken was sold as a generic product in 2007 (Goddard et al., 2007), although branded chicken products are becoming more common. Furthermore, the current findings are consistent with the results of the ALMA 2012 study where 31% of Canadians (N=1341) said that they bought branded chicken in 2010 compared to 30% in 2012 (ALMA, 2012). The different purchasing patterns for these products reaffirm the importance of choosing two very different products for the analysis.

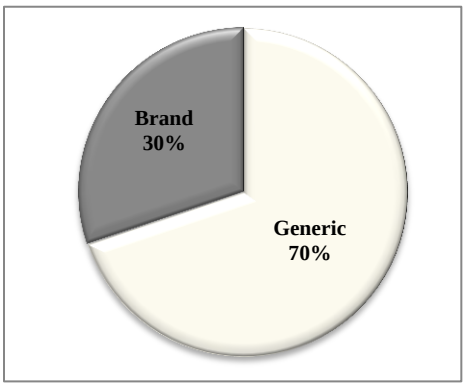

Figure 4.9: Purchase of branded versus generic chicken

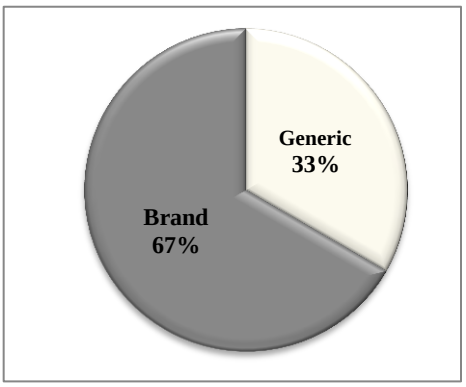

Figure 4.10: Purchase of branded versus generic packaged salad

Chicken brands

For fresh chicken, about 62% of the respondents buy national brands such as *Maple Leaf*, *Lilydale*, *Exceldor*, *Granny's* and *MapleLodge*. *Maple Leaf* emerges as the most frequently purchased brand, followed by *Lilydale*. Indeed, Maple Leaf and Lilydale are the two major competitors in the Western Canadian poultry market; corresponding market shares on average are around 5% and 1%, respectively (Goddard et al., 2007). Thirty percent of those who buy chicken brands purchase private labels such as *President's Choice* (Real Canadian Superstore/Loblaw's), *PC Bleu Menu*, *Compliments* (Sobeys/IGA) and *Safeway*. It appears that *Presidents' Choice* has the higher market share for store brands within this sample compared to *Safeway* or *Sobeys* labels (Figure 4.11).

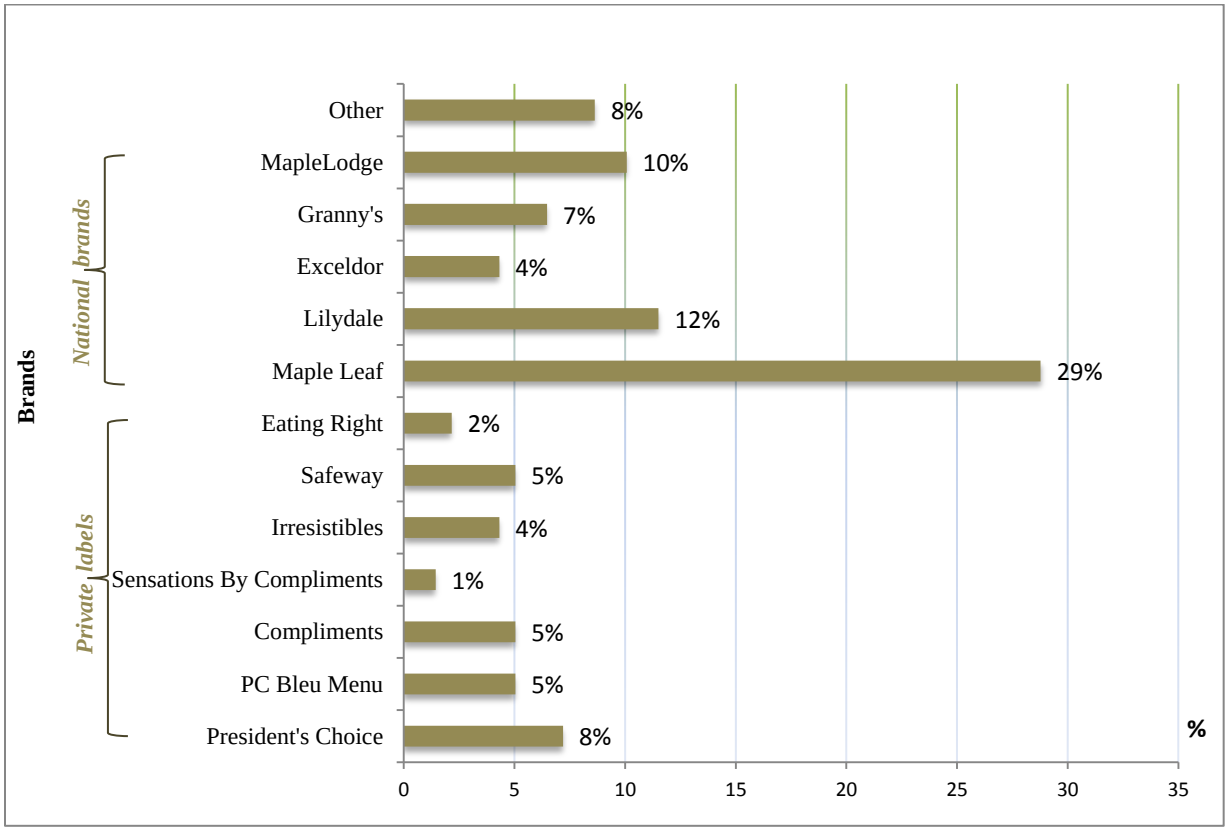

Figure 4.11: Percentage of respondents purchasing chicken brands

In the chicken sample, 48% think (agree and strongly agree to: "I think the reason packaged salad/chicken brands are usually more expensive than generic salad is their higher quality") that chicken brands are usually more expensive than generic versions. About 24% of the respondents disagree and strongly disagree with this statement. As such, the price could be a reason why the majority of consumers (70%) buy generic chicken meat. Indeed, in the 2012 meat study by ALMA, it was found that price is most important attribute for chicken consumers than for any of the other meats, followed by country of origin (i.e. Product of Canada). Related to this, a participant commented that "Chicken is a commodity that is far too highly priced in Canada and the quality is poor in general". Another one said that "I do not eat as much chicken now as in the past partly because it used to be inexpensive enough to have more than once or twice a week... no longer is this the case. I'd love to be able to afford a small roasting chicken... but not at today's prices".

Salad brands

For the fresh packaged salad, about 72% of the respondents buy national brands while 27% purchase store brands. *Dole*, *Fresh Express* and *Earthbound Farm Organic* are among the most purchased manufacturer brands with 33%, 15% and 10% of respondents purchasing these brands, respectively. *President's Choice Organic* (Loblaw's private label) and *Compliments* (Sobeys' private label) are the most purchased store brands of packaged salad. While a quarter of the participants do not perceive packaged salad brands to be more expensive than generic counterparts, 44% perceive the converse to be true.

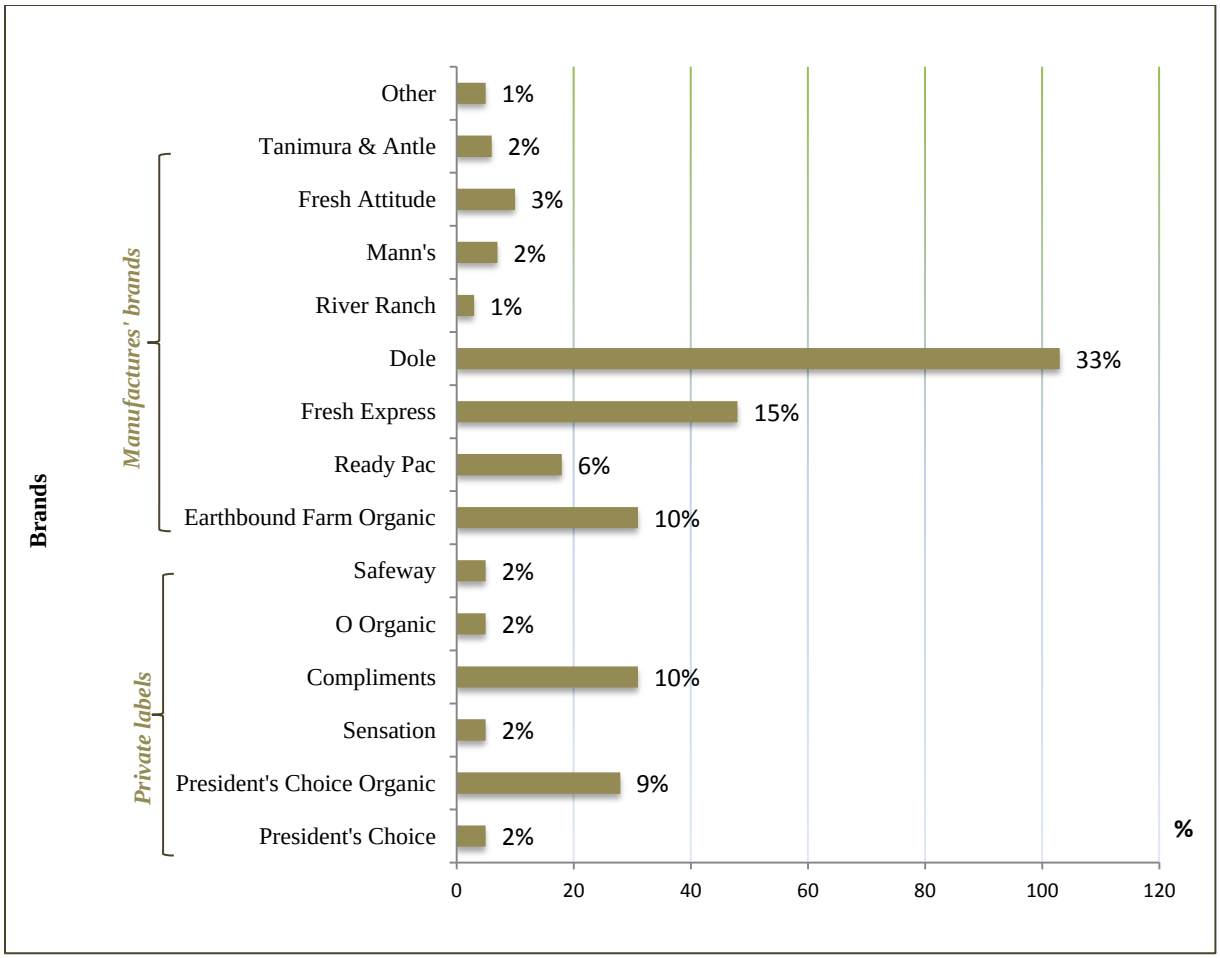

Figure 4.12: Percentage of respondents purchasing salad brands

4.3.3 Psychographics

Risk aversion, past experiences and ethical involvement are posited as variables that moderate the link between trust in the food system and in brands, and confidence in food attributes. This section identifies the proportions of respondents with high and low levels of risk aversion, good and bad past consumption experiences, and high and low levels of ethical involvement. In the survey, questions related to personal factors were Yes/No questions. Individuals who answered "No" to more than half of the Yes/No questions were considered to have low levels of risk aversion, good experiences, and low ethical involvement. For instance, three statements were used to measure risk aversion. A "Yes" option was coded as 1 and "No" as 0. As such, the value for risk aversion was obtained by averaging the three statements. Values of "0" (No, No, No) and "0.33" (No, No, Yes) reflect people with low levels of risk aversion and

values of ".67" (No, Yes, Yes) and "1" (Yes, Yes, Yes) reflect those with high risk aversion. Descriptive statistics for the personal characteristics are detailed below.

- **Risk aversion**

Questions on risk aversion were not specifically related to fresh chicken or packaged salad products, instead they concerned general perceptions of food products (see Table 4.4). Item 2 was reverse coded to make it symmetrical with the two other measures. Combined results from both samples show that 68%[5] of the sample population tend to have low levels of risk aversion toward food products. Since trust has been found to be negatively connected to risk (e.g. Siegrist, 2000; Siegrist, Cvetkovich and Roth, 2000; Williams and Hammitt, 2001; Saba and Messina, 2003), results imply *a priori* that a majority of Canadians appear to have a certain degree of trust in the food system and in food products.

- **Past consumption experiences**

Participants were asked whether they are happy with the product or brand they buy (item 1 was reverse coded), and whether they had switched away from a product or a brand after a safety or quality issue (see Table 4.4). Results displayed in Figure 4.13 indicate that the majority of participants in both samples report good experiences with fresh chicken and packaged salad. About 10% of respondents had switched away from a salad or a chicken product mainly because of perceived poor quality of the product. Among the reasons provided for switching away from a bagged salad product are: the high level of moisture in the bag which leads to brown or rotten leaves, plastic and chemical after-taste, product recall (*Dole* was mentioned a few times). For chicken, the reasons given for switching products included: product recall (*Maple Leaf* was mentioned a few times), bad taste ("chemical", "chewy"), bad smell, lack of freshness which in some cases led respondents to switch to frozen chicken.

[5] In the chicken (salad) sample, 33 (31) % of participants exhibit high levels of risk aversion, while 67(69) % exhibit low levels of risk aversion.

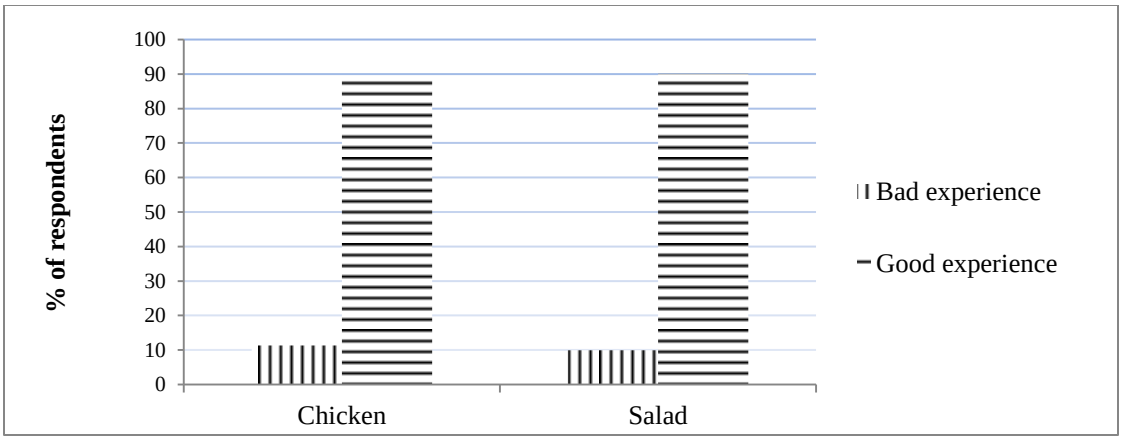

Figure 4.13: Past experiences with chicken and salad products

- **Ethical involvement**

As described in section 2.5.3, ethical involvement is of two forms: general long-term consumer concerns about current food production methods – ethical intentions, and actual purchase of products emphasizing ethical attributes (e.g., GM-free food) – ethical behaviour. To measure this concept, participants were asked to answer three questions related to their concerns about animal welfare, environment and GM products, and four questions about purchasing ethical food products (Table 4.4). Based on the responses, individuals were categorized with lower (passive) and higher (active) levels of ethical intentions (behaviour).[6] As displayed in Figure 4.14, about 85% of the participants in the chicken sample and 87% of the salad sample were highly concerned about the way the food is produced and processed. About 14% participants from the chicken sample and 13% from the salad sample exhibited lower levels of ethical intentions.

[6] People who answered "Yes" to at least two questions related to the ethical intentions were considered with higher ethical intentions, otherwise with lower ethical intentions. Those who answered "Yes" to three questions or more related to the ethical behaviour were considered to exhibit active ethically-motivated behaviour.

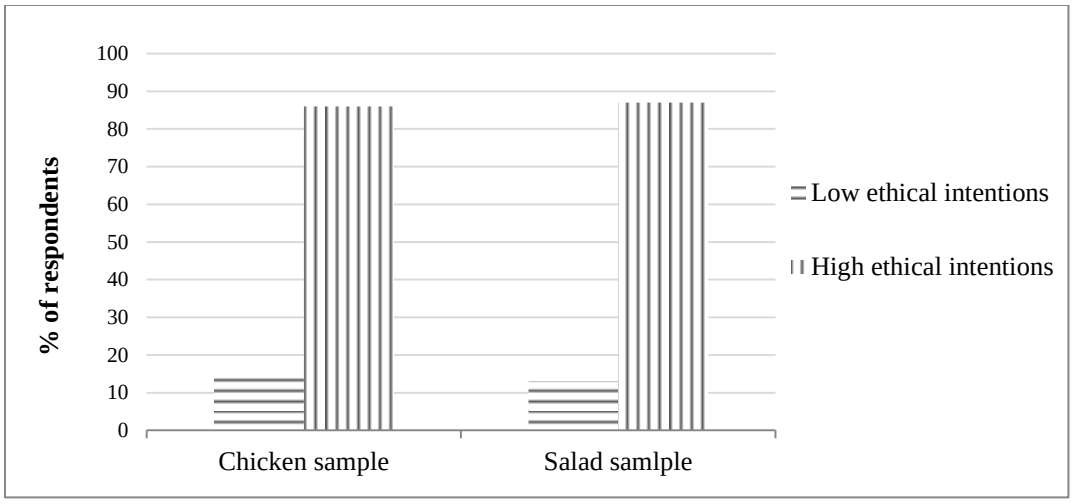

Figure 4.14: Ethically-motivated intentions of respondents

Regarding responses to ethically-motivated behaviour, results are displayed in Figure 4.15 below. About 60% of the respondents in the chicken sample compared to 56% in the salad sample exhibited active ethically-motivated behaviour. Furthermore, more than half (38% in the chicken sample and 35% in the salad sample) of the respondents with active ethical behaviour said that they avoid purchasing GM food whenever they can. In both samples, 22% claimed that they have taken an active part in public or political actions in order to improve the food they buy, for example, by donating money to an environmental organization or by participating in a demonstration about food.

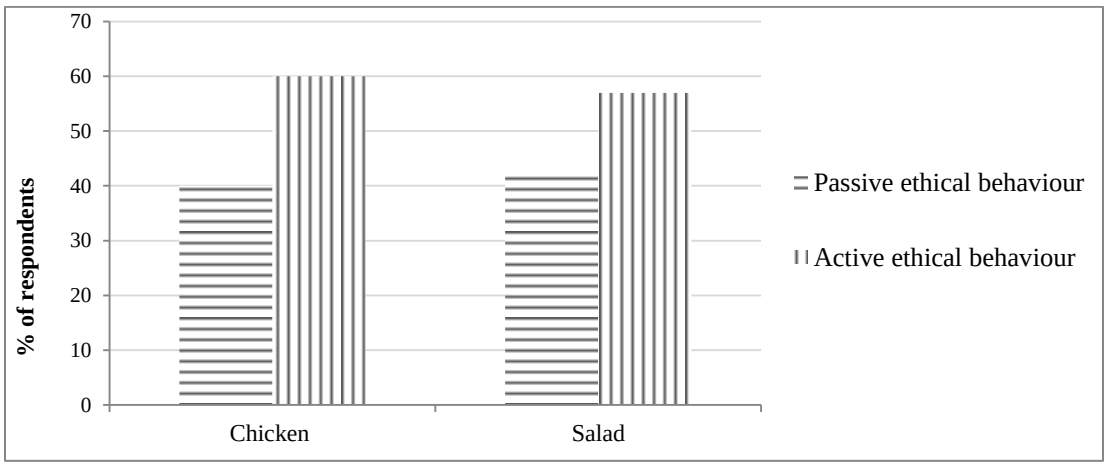

Figure 4.15: Ethically-motivated behaviour of respondents

The difference in proportions between participants' ethical intentions and ethical behaviour confirms the gap between consumer buying intentions and the effective purchase (Strong, 1996; De Pelsmacker, Driesen and Rayp, 2005). In this thesis, it is more interesting to link the level of ethical involvement with behavioural variables like brand loyalty. Thus, measures for the ethical behaviour (i.e. *invol4*, *invol5*, *invol6* and *invol7*) are used for the empirical analysis rather than the ethical intentions since these are not necessary reflected in the purchasing decisions.

4.3 Conclusion

The first section of this chapter described the research design and justified the sampling and products used in the survey tool. The second section provided a descriptive analysis of the sample population with regard to demographic characteristics, purchase habits and personal attitudes. The population sample is reasonably representative of the Canadian population with respect to gender, age and geographic location, and slightly biased toward higher income and better educated respondents. Furthermore, the sample is dominated by individuals with low levels of risk aversion, good past experiences and high levels of ethical involvement in food purchases. Since the sample selected is random albeit from a consumer panel and is sufficiently large, the attitudinal patterns exhibited by the study sample can be considered as a reasonable reflection of the general population. The following chapters present the estimation results using the two-step approach to SEM.

Chapter 5 - Assessment of the Measurement Model

5.1 Introduction

A two-step procedure to developing a SEM is employed to examine the posited relationships derived in Chapter 2. This chapter assesses the measurement component of the full SEM model that consists of several latent variables influencing the respondents' answers to indicator variables. The next chapter estimates the structural part in which the hypotheses are tested for significance. Because the path portion of a full SEM involves relationships among only latent variables, in which the primary concern is to evaluate the extent to which these connections are valid, it is critical that the measurement of each factor is psychometrically sound. Thus, an initial step in analysing full latent variable models is to test the validity of the measurement component before attempting to assess the structural component. Therefore, this chapter encompasses a first section that assesses normality and outliers, and a second section that evaluates the measurement model. The empirical application in both chapters 5 and 6 uses SPSS Amos 20 (Analysis of Moment Structure).

5.2 Assessment of Normality and Outliers

In (confirmatory[7] or exploratory[8]) factor analysis, the observed variables (measures) are considered functions of latent constructs (factors). The current measurement model uses confirmatory factor analysis (CFA) in which measures are only connected with some pre-specified factor. Each latent variable is presumed to be unidimensional (i.e. every item loads on only a single factor). Furthermore, error terms are allowed to correlate and some of the parameters may be constrained to non-zero values for identification purposes (Blunch, 2008). The two most common constraints are to set either the variance of the factor or one of its loadings to one, and the same goes for the error terms. The variable with a fixed loading of unit is called a marker variable or reference item. For most of the indicators in this thesis, the three-indicator rule was applied, although the two-indicator rule (i.e. two indicators for each factor) was adopted for a few other factors such as trust and repurchase intentions (see section 4.2). The

[7] Used when the researcher has some knowledge of the underlying latent variable structure (Byrne, 2010)
[8] Designed for the situation where links between the observed and latent variables are unknown or uncertain (Byrne, 2010)

purpose of using a CFA is to validate and confirm the dimensionality of the latent variables, which allows respecifying the measurement model (e.g., dropping non-reliable items) for hypothesis testing. Prior to this step, relevant statistical analyses of the sample are discussed, including an assessment of normality and a detection of multivariate outliers.

5.2.1 Assessment of Normality

In general, SEM analyses are conducted under the assumption of multivariate normality (MVN) for the dependent variables (Byrne, 2010). This is one of the main concerns in SEM since it influences the estimation method that should be used and the extent to which the estimates obtained are trustworthy. Among the practical implications of non-normality are inflated Chi-square statistics, inaccurate parameter estimates which leads to erroneous interpretation of the results, and failure to replicate findings (Lei and Lomax, 2005; Gao, Mokhtarian and Johnston, 2008). As such, it is crucial to check that MVN has been met before starting any data analysis (Byrne, 2010). A prerequisite to the assessment of multivariate normality is the need to check for univariate normality as the latter is a necessary, yet not sufficient condition for MVN (DeCarlo, 1997). That is, if a set of variables is distributed as multivariate normal, then each variable must be normally distributed. However, when all individual variables are normally distributed, the set of variables may not be distributed as multivariate normal. Hence, testing each variable only for univariate normality is not enough.

Statistical studies have shown that skewness tends to impact tests of means, whereas kurtosis affects tests of variances and covariances (DeCarlo, 1997). Since SEM is an analysis of covariance structures, "evidence of kurtosis is always of concern and, in particular, evidence of multivariate kurtosis, as it is known to be exceptionally detrimental in SEM analyses" (Byrne, 2010: 103). Results of the assessment of normality for the chicken and salad products are reported in Appendix 3, Table 3A where the last two columns list the univariate kurtosis value and its critical ratio for each item. Positive univariate kurtosis values were between .16 and 16.005 for chicken, and between .268 and 16.186 for salad. Negative values ranged from -.04 to -1.501 for chicken, and from -.059 to -1.228 for salad.

In a normal distribution, the standardized kurtosis index is equal to 3, which is rescaled (by SEM computer programs) such that zero becomes the indicator of normal distribution, and

its sign the indicator of positive or negative kurtosis (West, Finch and Curran, 1995; Kline, 2011). Since there is no clear agreement on the size of nonzero values of extreme kurtosis, different rules of thumb have been proposed (Kline, 2011). While Kline (2011) views kurtosis values larger than 10 as problematic, West, Finch and Curran (1995) judge values equal to or greater than 7 to be indicative of early departure points of nonnormality. Using the benchmark of 7 as a guide, a review of the kurtosis values reveals only one item (*exp1*) to be substantially kurtotic in both samples. The item *exp1* was a candidate for exclusion from the model. This means that *exp1* which is derived from the question "I am very happy with the product or brand I buy" does not appear to be a valid measure for consumers' past experiences.

Having checked the univariate distribution of observed variables, the index of multivariate kurtosis and its critical ratio (both of which appear at the bottom of the kurtosis and C.R columns in Table 3A of Appendix 3) were then examined. The C.R. value represents Mardia's (1970) normalized estimate of multivariate kurtosis. In a large and multivariately normal sample, Mardia's normalized estimate is distributed as a unit normal variate, with large values reflecting significant positive kurtosis and large negative values reflecting significant negative kurtosis (Byrne, 2010). In practice, values greater than 5.00 are suggested to indicate non-normal data (Bentler, 2005). In the dataset, the high values of the z-statistic (86.043 in the chicken sample and 61.193 in the salad sample) signal non-normality in both samples. Multivariate normality is affected by outliers that should be detected to purify the data, as discussed next.

5.2.2 Assessment of Multivariate Outliers

Since multivariate normality is very difficult to attain in applied studies, elimination of outliers would help to improve the normality profile of the data. "An outlier is a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that they distort statistics" (Tabachnick and Fidell, 2001: 66). The outliers are indicated by their Mahalanobis distance statistic, which represents the squared distance (D^2) in standard deviation units between a set of scores for one case and the sample means for all variables (centroids). An outlier would have a D^2 value that is markedly far from all the other D^2 values. That is, "the larger that the distance is, the larger the contribution that an observation is making to Mardia's multivariate kurtosis and, hence, to the

departure from multivariate normality" (Gao, Mokhtarian and Johnston, 2008: 116). As such, deletion of an outlier decreases Mardia's multivariate kurtosis. Additionally, AMOS provides two other statistics, p1 and p2. The p1 is the probability that an observation is exceeding its squared Mahalanobis distance, under the hypothesis of normality. The p2 indicates, assuming normality, the probability that the largest squared distance of any observation would exceed the centroid (i.e. calculated Mahalanobis distance). Arbuckle (1997) proposes a rule to determine which observations may be outliers: small numbers of p1 are to be expected, whereas small numbers of p2 signal observations that are unlikely to be distant from the centroid, under the assumption of normality. A review of these values can be found in Appendix 3, Table 3B that shows minimal evidence of serious multivariate outliers.

Synthesis

When the normality assumption is violated, analysis based on the traditional Maximum Likelihood (ML) estimation may be problematic, and therefore alternative modes of estimation are more appropriate to consider (Byrne, 2010). On the other hand, Arbuckle (1997: 239) advocates, "A departure from normality that is big enough to be significant could still be small enough to be harmless." That is, deviations from multivariate normality may not affect the results of the analysis. Furthermore, it is understood that meeting the condition of normality in SEM leads only to asymptotic conclusions, which are approximately true for large samples (Amos 20 User's Guide). To correct for non-normality in the current dataset, bootstrapping[9] is used and the results presented in the rest of the thesis are bootstrap ML estimates.

5.3 Measurement Model Evaluation

This section explores the measurement model of which reliability scores for the construct measures are tested. There are three reliability measures commonly used: squared multiple correlations (SMCs), item-total correlations and Cronbach's alpha (Hair et al., 2006). Unlike the latter, that sets an upper limit to reliability estimation, SMCs, so called R-squared, are used more frequently because they yield more conservative, lower bound estimates (Nunally, 1978; Jackson and Tweed, 1980). In this thesis, SMCs are used as reliability indicators of the extent to which

[9] The principle of bootstrapping is to consider a sample to be the population from which e.g. 500 samples are taken with replacement.

each item measures its latent factor (Koufteros, 1999; Schreiber et al, 2006; Lu, Lai and Cheng, 2007).

SMCs examine the internal consistency of the items to determine whether each observed variable should be retained or deleted. They reflect the proportion of variance that is explained by the indicators of the conceptual variable (Byrne, 2010). The remaining of the variance is accounted for by the error term of the item. Thus, to be reliable, items should reflect mostly the true scores rather than the error component (i.e. unreliability). Yet, there is no gold standard as to how large a reliability score should be. Rules of thumb on the agreement coefficients that range from poor to excellent can be found in the literature. According to Blunch (2008: 40), "often a minimum of 0.40 is used as a rule of thumb" for the SMC. Recommendations typically suggest that the variance extracted value for a construct should exceed 50% (Bollen, 1989; Hair et al., 2006; MacKenzie, Podsakoff and Jarvis, 2005). While correlations under .50 are not widely acceptable because they reflect measurement inaccuracy (i.e. most of the observed score variance is due to its residual term), lower level of reliability coefficients can be tolerated when sample size is sufficiently large in latent variable methods (Little, Lindenberger and Nesselroade, 1999).

Along with the reliability indicators, standardised loading scores should be significantly connected to the latent construct and have at least an estimate of 0.40 and ideally 0.70 and above (Lewis and Byrd, 2003; Hair et al., 2006). Indeed, low loading estimates reflect a weak relationship between the measures and their factor, and thus indicate a potential measurement problem. The reliability analysis follows the development of an individual measurement model for every factor and the overall measurement model to check for the validity of the measures. In assessing the measurement model and the structural model, AMOS provides a generous number of fit indices that were developed in chapter 3 (section 3.2.2, Table 3.1). The most commonly reported indices in the literature are used for this analysis, as summarized in Table 5.1 below.

Table 5.1: SEM fit indices reported in this thesis (adapted from Byrne, 2010)

Overall Model Fit				
Absolute Fit Indices		*Comparative Fit Indices*		
CMIN/DF (χ^2/df) [10]	**RMSEA**	**IFI**	**TLI**	**CFI**
$\chi^2/df \leq 2$: very good fit $2 < \chi^2/df \leq 5$: acceptable fit	< .05 : good fit <.06 – .08: reasonable fit .08 – .1 : mediocre fit > .1 : poor fit	> .90: adequate fit ≥ .95: superior fit		

5.3.1 Individual Measurement Sub-models and Modifications

This section of the thesis presents the initial findings of the measurement sub-models as well as the refinements applied to the model. Developing measurement models requires at the outset testing every factor individually for identification (see section 3.2.2). In SEM, identification is about whether there are enough pieces of information (i.e. known values and constraints) to produce unique estimates for all parameters. Thus, two conditions are required: (*i*) the t-rule is met (the number of distinct sample moments is at least as large as the number of parameters to be estimated), and, (*ii*) all latent variables including the error terms are assigned a scale (Blunch, 2008). Indeed, it is not possible to simultaneously estimate the coefficient and the variance of a residual term. Usually, the model is specified in the way that the coefficient is set to 1 and the variance is estimated (default setting in Amos). By fixing the coefficient at 1, the error term is measured in the same units as the latent variable (Blunch, 2008). The specification and identification steps applied to the measurement sub-models are portrayed in Figure 5.1 where the item *exp1* was dropped due to its high kurtosis (see section 5.2.1).

The generic measurement model encompasses reflective factors represented by ovals (e.g., food system trust or *Strust*) and their corresponding observed indicators represented by rectangles (e.g., trustworthiness of the food system or *Strust1* and reliance on the food system or *Strust2*). In Figure 5.1, Amos Graphics sets a regression weight equal to 1 (i.e. marker variable) for one path coefficient for every factor with three items or more and for every error variable in the model. In the case of a two-indicator factor such as system credibility (*Scred*), both regression weights were set to one in order to avoid a negative factor variance, otherwise, the model would fail to produce reasonable estimates. While having only two indicators to identify a

[10] Chi-square is reported as CMIN (minimum discrepancy) in AMOS

construct might be problematic, Little, Lindenberger and Nesselroade (1999: 207) suggest that "when two indicators of a construct are theoretically equivalent selections from the domain of possible indicators, placing equality constraints on the respective loadings is theoretically defensible and, on average, leads to accurate recovery of the true construct".

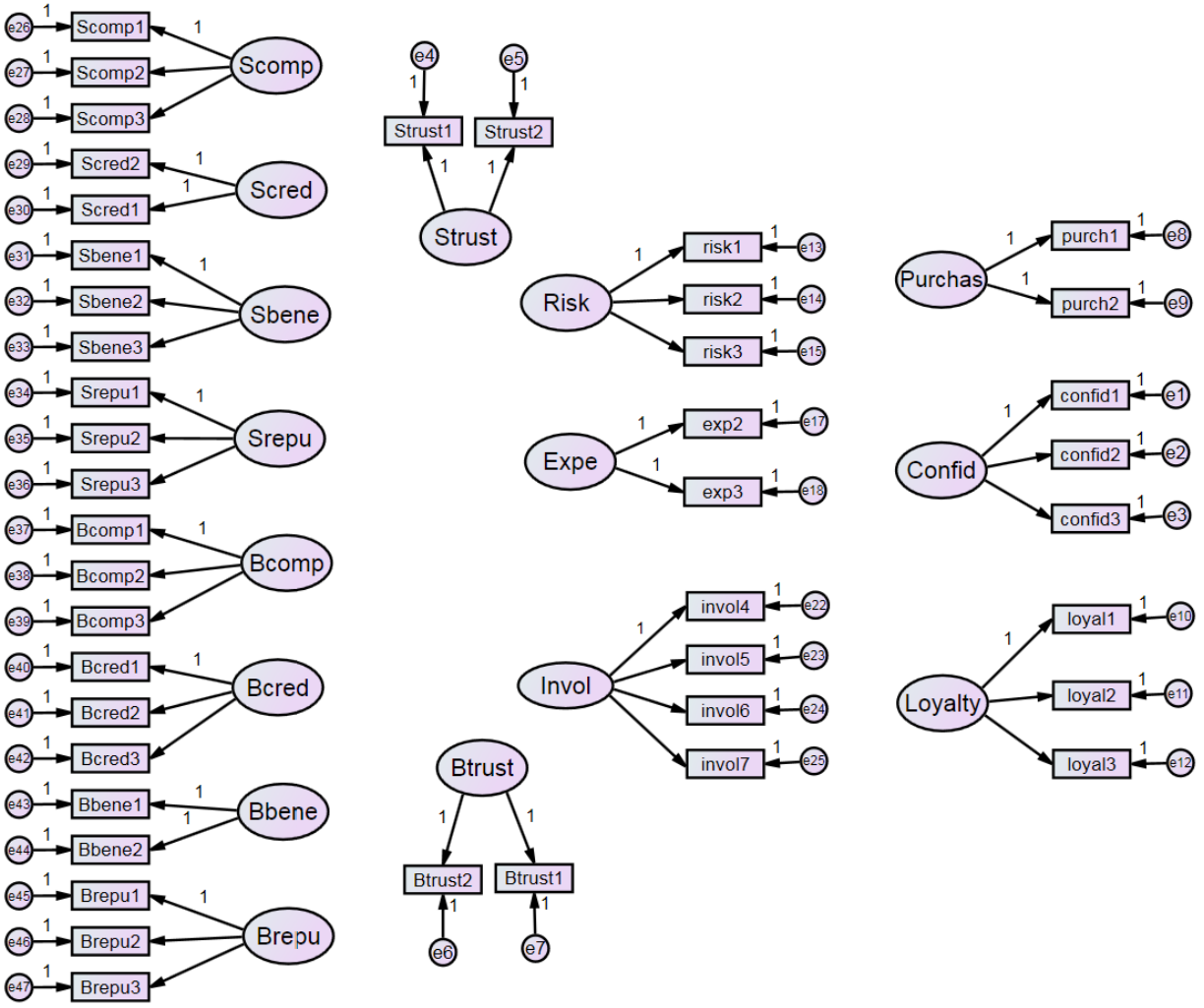

Figure 5.1: Generic measurement model

Along with the identification, modifications indices (MIs) in AMOS output are the options for respecification when the model shows a poor fit. MIs indicate the improvement in fit that will result from the inclusion of a particular relationship (e.g. correlation) in the model. As such, they suggest directions of changes that are likely to pay off in smaller chi-square values. Anderson and Gerbing (1988) recommend that under a converged solution but unacceptable fit, connecting or deleting indicators from the model are the preferred ways to respecify the model.

In other words, item deletion and adding a new path indicator are the best ways to improve the model fit. Any change in this iterative process alters the parameters and model fit statistics. Furthermore, as the sample size of the dataset is sufficiently large, it is believed that the hypothesised model will converge and produce reliable results. With the objective of isolating and locating any errors in specifying each factor, the measurement model for each construct is checked for identification and estimation results for chicken and salad are discussed below.

- **System trust**

System trust (*Strust*) was measured using two indicators: *Strust1* and *Strust2*. *Strust1* asked for respondents' perceptions regarding food system trustworthiness, and *Strust2* asked about its reliability (see Table 4.2). The findings relative to the chicken and salad products are presented in Table 5.2 below. Inspection of the results reveals high loadings as well as strong reliability. For instance, a one standard deviation increase in *Strust* is associated with a .93 (.94) and .95 (.94) standard deviation increase in *Strust1* and *Strust2*, respectively, for chicken (salad). Since in a simple linear regression, a standardised regression coefficient is the same as the correlation coefficient, one can say that *Strust* correlates .93 (.94) with *Strust1* and .95 (.94) with *Strust2*, respectively, for the chicken (salad) product.

The items *Strust1* and *Strust2* for chicken (salad) account for 87% (89%) and 95% (89%) of the variance of the factor *Strust*. The remaining variance is accounted for by the error terms *e4* and *e5* (Figure 5.1). This means that perceived trustworthiness of the food system (*Strust1)* and its reliability (*Strust2)* have a strong predictive power on trust in the food system (*Strust*) for both products. As for the model fit, the measurement model for system trust is just-identified: the model has zero degrees of freedom, a null χ^2 statistic, and consequently, no probability level can be assigned to this statistic. As such, the model should fit the data as supported by the perfect IFI, TLI and CFI scores of 1.

Table 5.2: Summary of findings for system trust

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Strust1	.93	.93	.87	.87
Strust2	.95	.97	.91	.85

➢ **System competence**

System competence was gauged by three indicators: *Scomp1* (knowledge of quality and safety standards), *Scomp2* (expertise to control quality) and *Scomp3* (inspection/monitoring). When estimating initially the measurement model for *Scomp*, the model converged to a proper solution for chicken but not for salad due to the negative variance of the error term (*e27)* of *Scomp2*. To get around this issue, that variance was set to 1. Re-estimating the model led to some fit indices that are consistent in their reflection of an ill-fitting model. In fact, the output reported a CMIN/df=85.565, and RMSE=.427>.05. To improve the model fit, the MIs were examined. In reviewing the covariance parameters, the highest MI=54.624 is the decrease in χ^2 that will occur if the error terms *e26* and *e28* are allowed to correlate. Considering such a suggestion, the model became just-identified. Findings are displayed in Table 5.3 below.

Table 5.3: Summary of findings for system competence

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Scomp1	.93	.86	.87	.75
Scomp2	.91	.94	.82	.88
Scomp3	.56	.86	.32	.74

Examination of the scores indicates that a one standard deviation increase in system competence (*Scomp*) is associated with a .93 (.86), .91 (.94) and .56 (.86) standard deviation increase in *Scomp1, Scomp2*, and *Scomp3*, respectively, for chicken (salad). Furthermore, item 1, item 2 and item 3 account for 87% (75%), 82% (88%) and 32% (74%) of the variance of the factor *Scomp* for the chicken (the salad) product. Due to the low reliability of item 3 for chicken and to the error correlation between item 1 and item 3 for salad, it was decided to drop *Scomp3* from the model. The low reliability of the item might be explained by the fact that item 3 applies only to government who does the inspection/monitoring but not to the other actors within the food system. In other words, inspection/monitoring (item 3) might be a good measure for government's competence but not for the competence of the whole food system.

The new scores for *Scomp1* and *Scomp2* are .93 (.95) and .90 (.85); corresponding reliabilities are 87% (91%) and 82% (72%) for chicken (salad). These results reveal that the

importance of measures varies from one food product to another. In fact, while knowledge and expertise have a similar predictive power on system competence for the chicken product, knowledge appears to have a slightly higher impact on *Scomp* than expertise for salad.

- **System credibility**

Transparent information provided by the food system (*Scred1*) and the provision of information that is perceived to be true (*Scred2*) were the two measures of system credibility (*Scred*). Results are portrayed in Table 5.4. A look at the standardized regression weights indicates that *Scred1* and *Scred2* have high loadings exceeding .75 for both products. Furthermore, all items correlate at .74 or better. In other words, both indicators explained more than 70% of the variance of *Scred*. Hence, there is sufficient evidence to argue that transparent information and the provision of accurate information about food safety are good measures of system credibility.

Table 5.4: Summary of findings for system credibility

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Scred1	.88	.78	.78	.88
Scred2	.86	.78	.74	.89

- **System benevolence**

System benevolence (*Sbene*) was captured through the attention paid to consumers' demand for high quality (*Sbene1*), the importance of consumers' health (*Sbene2*), and the adoption of socially and environmentally responsible practices (*Sbene3*). As shown in Table 5.5 below, each of three reflective indicators exhibited high loadings as well as acceptable SMCs for both products. For chicken (salad), the scores for *Scomp1*, *Scomp2* and *Scomp3* were .85 (.88), .85 (.81) and .93 (.90); corresponding reliabilities were 72% (78%), 73% (65%) and 86% (82%). Hence, results indicate that the three measures are truly representative of the construct with item 3 (corporate social responsibility) being the strongest contributing measure to system benevolence.

Table 5.5: Summary of findings for system benevolence

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Sbene1	.85	.88	.72	.78
Sbene2	.85	.81	.73	.65
Sbene3	.93	.90	.86	.82

- **System reputation**

Consistent responses to food safety incidents (*Srepu1*), word-of-mouth (*Srepu2*), and system image (*Srepu3*) were the three items used to measure system reputation (*Srepu*). As reported in Table 5.6, regression weights were above the minimum recommended level of .50. Indeed, the factor loadings ranged from .87 to .93 and item reliability from 67% to 87%, with system image having the highest impact on system reputation.

Table 5.6: Summary of findings for system reputation

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Srepu1	.89	.91	.80	.83
Srepu2	.87	.82	.76	.67
Srepu3	.93	.92	.87	.85

- **Brand trust**

Brand trust (*Btrust*) was assessed by two items: *Btrust1* and *Btrust2* (see Table 4.3). Both indicators exhibited high factor loadings exceeding .80, as illustrated in Table 5.7. In addition, reliability indicators were greater than the cut-off of 50%. With its slightly higher loading and reliability, whether a brand delivered reliable quality (*Btrust2*) has relatively more predictive power on brand trust than brand trustworthiness for both products. For instance, *Btrust2* explains 83% of the variance of *Btrust*, whereas *Strust1* explains 70% of the construct variance for salad.

Table 5.7: Summary of findings for brand trust

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Btrust1	.83	.84	.68	.70
Btrust2	.87	.91	. 76	.83

- **Brand competence**

Brand competence (*Bcomp*) was examined as a three-item construct (see Table 4.3). *Bcomp1* asked for participants' beliefs regarding brand quality, *Bcomp2* asked about brand safety, and *Bcomp3* asked about brand superiority compared to generic counterparts. Results are displayed in Table 5.8. In terms of factor loadings, all scores met the desirable recommended level of .50. They ranged from .56 to .94, whilst reliability ranged between moderate (>30%) to good (88%) values. Brand quality was revealed to exhibit the greatest predictive power on brand competence, much more so than the two other items. Despite their modest reliability, item 2 and item 3 were highly significant for both the chicken and the salad products.

Table 5.8: Summary of findings for brand competence

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Bcomp1	.90	.94	.81	.88
Bcomp2	.56	.59	.32	.35
Bcomp3	.71	.59	.51	.35

- **Brand credibility**

Brand credibility (*Bcred*) was captured using three items: *Bcred1* (transparent quality information), *Bcred2* (accurate safety information) and *Bcred3* (brands are expensive due to their overall high quality). Loadings and reliability results are presented in Table 5.9. Overall, regression weights were acceptable, with item 3 receiving the lowest score for both products. In other words, transparent quality information (*Bcred1*) and accurate safety information (*Bcred2*) have greater predictive power with respect to brand credibility. Due to its low reliability, item 3 was removed. The new scores for *Bcred1* and *Bcred2* are .80 (.79) and .76 (.80); corresponding reliabilities are 64% (63%) and 58% (64%) for the chicken (salad) product, respectively.

Table 5.9: Summary of findings for brand credibility

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Bcred1	.66	.78	.43	.61
Bcred2	.93	.81	.86	.65
Bcred3	.54	.56	.29	.32

- **Brand benevolence**

A couple of items were used to gauge brand benevolence (*Bbene*). *Bbene1* asked consumers whether they think the brand they buy enhances their well-being. *Bbene2* asked them whether they think the brand they purchase is produced in a socially and environmentally responsible manner. Examination of the results, portrayed in Table 5.10, reveal that both items exhibited desirable loadings as well as minimum recommended indicator reliability for both products. Indeed, all items correlate at 58% and above.

Table 5.10: Summary of findings for brand benevolence

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Bbene1	.76	.79	.58	.63
Bbene2	.77	.82	.59	.67

- **Brand reputation**

Brand reputation (*Brepu*) was measured by three items: *Brepu1* (consistent overall quality of the brand), *Brepu2* (positive word-of-mouth) and *Brepu3* (positive brand image). Inspection of the scores in Table 5.11 shows desirable loadings ranging from .72 to .85, and acceptable SMCs going from 52% to 72%. Brand image (*Brepu3*) was the most reliable measure (with the highest score) for chicken and salad. This means that brand image, like system image, is the strongest contributing indicator to brand reputation.

Table 5.11: Summary of findings for brand reputation

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
Brepu1	.75	.78	.56	.61
Brepu2	.75	.72	.56	.52
Brepu3	.85	.82	.72	.66

- **Confidence**

Confidence (*Confid*) was examined as a three-measure construct. *Confid1* asked participants for their degree of certainty regarding the quality and safety of the product. *Confid2* asked them about their optimism with the overall quality of the product, while *confid3* asked

whether they are familiar with the overall quality. Findings summarized in Table 5.12 indicate that the guidelines for acceptable loadings are met. In fact, scores varied between .55 and .85. For the correlations, item 2 and item 3 exhibited desirable reliability (>60%), while item 3 has a moderate SMC, for both products. Stated differently, certainty and optimism have much more impact on confidence than familiarity with a product's quality. Thus, item 3 was dropped from the model. The new scores for *confi1* and *confid2* are .83 (.80) and .83 (.83); corresponding reliabilities are 69% (63%) and 70% (69%) for the chicken (salad) product, respectively.

Table 5.12: Summary of findings for consumer confidence

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
confid1	.85	.84	.73	.71
confid2	.81	.78	.66	.61
confid3	.60	.55	.36	.30

- **Repurchase intentions**

Repurchase intentions (*Purchas*) was gauged by a couple of items. *Purch1* asked participants whether they check the prices of other chicken/salad products before buying the same product or brand. *Purch2* examined the likelihood of avoiding purchasing a product or a brand in the context of a hypothetical food safety incident. As shown in Table 5.13, scores as well as reliability coefficients were below the minimum recommended value of .50. Indeed, both items accounted for 20% and less of the variance of *Purchas*[11]. Although the reliability indicator did not meet the 50% cut-off for chicken, both items were retained otherwise the factor would disappear from the model. In this context, Little, Lindenberger and Nesselroade (1999) argue that indicators of poor psychometric quality (e.g., low reliabilities, small common variance) can yield accurate estimates of the relationships among constructs in some cases[12]. That is, "high indicator inter-correlations are not always better than low indicator inter-correlations" (Little, Lindenberger and Nesselroade, 1999: 207).

[11] When dropping item 2 from the salad, the model yield a poor fit (RMSEA=.525, CFI=0). Furthermore, MI suggested a correlation between Purchas and e8. Since this is not theoretically justified, both items are kept for the model to be identified.

[12] (a) They are spread out across the construct domain sufficiently to capture the centroid, (b) yield sufficient variability on the construct, and (c) are analyzed by confirmatory analysis.

Table 5.13: Summary of findings for repurchase intentions

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
purch1	.45	.42	.20	.18
purch2	.43	.38	.19	.15

- **Brand loyalty**

Loyalty was measured using three items: *loyal1* (As long as I am satisfied, I will usually stick with purchasing the same brand or product), *loyal2* (When the product or brand I usually buy is not available in my usual shopping store, I go and look for it in another store), and *loyal3* (When another product or brand is having a sale, I generally buy it instead of my usual product or brand). Prior to the estimation of the model, item 3 was reverse coded to be symmetrical with the two other measures. The model did not converge to an admissible solution for chicken because of a negative error variance (*e11*). After scaling to one that parameter, the output indicated that item 3 has no reliability for chicken (score .03, SMC=.00). Likewise, *loyal3* was not reliable for salad (SMC= 1%), therefore, the item was excluded from the model.

Results on the two retained indicators are reported in Table 5.14. Consumer satisfaction (*loyal1*) has more predictive power with respect to brand loyalty than *loyal2* (searching for the product or brand in other stores). In fact, *loyal1* accounted for 38% and 37% of the variance of the latent variable, whereas loyal 2 accounted for 22% and 20% of that variance, for the chicken and the salad products, respectively.

Table 5.14: Summary of findings for brand loyalty

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
loyal1	.62	.61	.38	.37
loyal2	.47	.45	.22	.20

- **Risk aversion**

Three items were used to measure risk aversion (*Risk*). *Risk1* asked participants about their reluctance to try new food, *risk2* probed their tolerance to risk, and *risk3* explored their level of anxiety toward a publicized food safety event. Initial results yield a low score and poor

reliability for item 2 (SMC=4% and 1% for chicken and salad) which was removed as it may not be measuring the same construct as the other indicators. Final results are presented in Table 5.15 where loadings and reliability coefficients reflect a modest relationship between the indicators and their respective construct.

Table 5.15: Summary of findings for risk

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
risk1	.43	.47	.18	.22
risk3	.40	.42	.16	.18

- **Past consumption experiences**

Consumers' experience (*Expe*) with the chicken and salad products was captured through *exp2* (switching away from the product after a quality issue), and *exp3* (switching away from the product after a safety concern). Results reported on Table 5.16 indicate that overall loadings and correlation values are desirable. Safety concerns with a product or a brand appear to have more predictive power (68% and 83%) with respect to consumers' experience than quality issues (60% and 47%). This effect is slightly larger for salad. One plausible explanation behind the higher concern with the safety of packaged salad is that this produce is consumed fresh and uncooked whereas chicken is consumed after being cooked (biological variation). Cooking lowers some food safety risks (e.g., by killing pathogens).

Table 5.16: Summary of findings for experience

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
exp2	.78	.69	.60	.47
exp3	.83	.91	.68	.83

- **Ethical involvement**

Initially, seven items were used to measure ethical involvement, among which three indicators gauge ethical intentions and four capture ethically-motivated behaviour (see Table 4.4). As advanced in section 4.3.1.3, ethically-motivated behaviour (i.e. actual purchase of 'ethical' food products) is more of interest in this thesis. Initial analysis did yield a good fit to the

data with CMIN/df=3.510, RMSEA=.052 and CFI=.98. Yet, upon inspection of the loadings and reliabilities, item 7 needed to be removed as the cut-off ranges of its loading and reliability were below the recommended values.

Final results of the just-identified model are summarised in Table 5.17. Overall, scores are acceptable, and reliability indicators range from modest (27%) to satisfactory (57%). For both products, avoiding the purchase of GM food products is the least contributing measure to ethically-motivated behaviour. While purchasing animal friendly products (item 4) is the strongest contributing factor to ethical behaviour for chicken, the purchase of eco-friendly products is the most important indicator to ethical behaviour among respondents for salad. That is, while respondents in the chicken sample tend to care more about the animal welfare attribute, those in the salad sample seem to adhere more to social and environmental attributes.

Table 5.17: Final Summary of findings for ethically-motivated behaviour

Item	*Standardized loading*		*SMC*	
	Chicken	*Salad*	*Chicken*	*Salad*
invol4	.75	.63	.57	.40
invol5	.64	.67	.42	.44
invol6	.52	.63	.27	.39

Synthesis

Most of the constructs yielded admissible solutions from the first analysis of the data except for system competence for the salad product and brand loyalty for the chicken product. These two constructs did not converge to a proper solution due to negative residual variances. Most often, negative variances are caused by correlations between indicators of a common factor that have been ignored (Blunch, 2008). These correlations arise due to problems in formulating items that are very similar (Blunch, 2008). This situation is called a "Heywood case" in the factor analysis literature. On the other hand, most of the measurement sub-models have achieved a range of fairly good to very good reliability scores among the indicators that measure the constructs. A few factors, including risk aversion, brand loyalty, and repurchase intentions exhibited modest reliability coefficients. Removing items deemed unreliable (six measures: *Scomp3*, *Bcred3*, *confid3*, *risk2*, *invol7* and *loyal3*) was the option embraced to purify the scales.

As such, most of the measures can be judged reliable and valid. Indeed, "for a reflective indicator, the item reliability is equal to the item validity or the squared multiple correlation for the item as long as only one latent construct causes each measure" (MacKenzie, Podsakoff and Jarvis, 2005: 727). The purified scales are retested for reliability and validity in the following section where the overall model is also checked for significance. Of interest is that the importance of items in determining some factors varied slightly from one product to another, which may indicate that contributing elements to food trust differs across product categories.

5.3.1 Overall Measurement Model

The purified measures were retested for reliability and validity with the results shown in Table 5.18. The overall measurement model test is conducted by allowing every latent variable to covary freely with other factors in the model (Hatcher, 1998). Results on the statistical significance of the items, the validity of the conceptual variables and the overall measurement model fit are discussed in this section.

Statistical significance of the parameter estimates

The first two columns of Table 5.18 display the standardised estimates of the parameters, and their tests of statistical significance for both products (p-values of a two-sided test). The null hypothesis is that the parameter in question is zero. *** means that the p-value is less than .001, that is the corresponding coefficients are significantly different from zero at the .001 level. To be viable, estimates should exhibit the correct sign and size, and be consistent with the underling theory. Based on these insights, all parameters have the correct expected sign for chicken and salad. Furthermore, most of the scores exhibit the ideally recommended level of .70 (Lewis and Byrd, 2003; Hair et al., 2006), except for the items of the last five constructs in the table. Despite their low loadings, these items are statistically significantly different from zero at the .001 level.

Table 5.18: Constructs measurement and reliability

	Chicken				*Salad*			
	Item significance		*Construct validity*		*Item significance*		*Construct validity*	
	Standardized loading	***p-value***	***Composite Reliability (C.R.)***	***Average Variance Extracted (AVE)***	***Standardized loading***	***p-value***	***Composite Reliability (C.R.)***	***Average Variance Extracted (AVE)***
Consumer confidence			**.820**	**.696**			**.799**	**.667**
confid1	.865	***			.754	***		
confid2	.802	***			.876	***		
System trust			**.953**	**.910**			**.941**	**.889**
Strust1	.953	***			.947	***		
Strust2	.955	***			.939	***		
System competence			**.915**	**.843**			**.896**	**.812**
Scomp1	.938	***			.915	***		
Scomp2	.898	***			.887	***		
System credibility			**.865**	**.764**			**.879**	**.784**
Scred1	.815	***			.849	***		
Scred2	.929	***			.920	***		
System benevolence			**.909**	**.769**			**.900**	**. 751**
Sbene1	.89	***			.907	***		
Sbene2	.851	***			.814	***		
Sbene3	.889	***			.877	***		
System reputation			**.926**	**.808**			**.916**	**.784**
Srepu1	.907	***			.913	***		
Srepu2	.867	***			.818	***		
Srepu3	.921	***			.921	***		
Brand trust			**.836**	**.719**			**.866**	**.764**
Btrust1	.867	***			.863	***		
Btrust2	.828	***			.885	***		
Brand competence			**.772**	**.532**			**.747**	**.497**
Bcomp1	.810	***			.752	***		
Bcomp2	.678	***			.722	***		
Bcomp3	.694	***			.636	***		
Brand credibility			**.768**	**.627**			**.775**	**.633**
Bcred1	.692	***			.779	***		
Bcred2	.880	***			.812	***		
Brand benevolence			**.738**	**.585**			**.789**	**.652**
Bene1	.773	***			.798	***		
Bbene2	.757	***			.817	***		
Brand reputation			**.836**	**.719**			**.816**	**.597**
Brepu1	.765	***			.795	***		
Brepu2	.757	***			.709	***		
Brepu3	.828	***			.809	***		
Repurchase intentions			**0.335**	**.206**			**.276**	**.160**
Purchas1	.370	***			.416			
Purchas2	.524	***			.384			
Brand loyalty			**0.451**	**.292**			**.429**	**.275**
loyal1	.580	***			.497	***		
loyal2	.498	***			.546	***		
Risk aversion			**.371**	**.265**			**.499**	**.401**
risk1	.246	***			.334	.002		
risk3	.685	***			.586	***		
Past experience			**.820**	**.704**			**.781**	**.644**
exp2	.641	***			.666	***		
exp3	.999	***			.941	***		
Ethical behaviour			**.677**	**.416**			**.678**	**.412**
invol4	.743	***			.633	***		
Invol5	.651	***			.673	***		
Invol6	.523	***			.619	***		

Construct reliability

According to Table 5.18, except for ethical behaviour, risk aversion, brand loyalty and repurchase intentions, all constructs exhibit good composite reliability exceeding the threshold of .70 (Nunnally, 1978), and their extracted variances are above 50%, thereby demonstrating that the variance accounted for by the scale is larger than the variance due to measurement error (Fornell and Larcker, 1981). Hence, these constructs and their measures are of high validity. The measures used in this thesis are adopted from the existing literature (see Table 3.6). The items with low scores were dropped as they reflect a weak relationship between the observed variable and the factor. In other words, this indicates a potential measurement problem: they are likely to be measuring a different construct from other items in the scale.

Overall model fit

The estimated measurement model shows a satisfactory fit: CMIN/DF=3.029 (2.900), RMSEA=.066 (.064), CFI=.946 (.950) for chicken (salad). To improve the fit, a few items were dropped from the model as the MIs (>20) indicate that the respective error terms are highly correlated with other measurement errors (*Sbene2*, *Bcomp3* and *Brepu3* were dropped from the chicken model; *Sbene2*, *Bcomp3* and *Brepu2* were dropped from the salad model). Due to the complexity of the figures that can be found in Appendix 4, only tabulated goodness-of-fit statistics are presented in Table 5.19 below. The normalized chi-square values are 2.576 for chicken and 2.489 for salad. Furthermore, the RMSEA values (.059 for chicken and .051 for salad) are below the cut-off value of .08, thereby indicating a good fit. Finally, the comparative fit indices (i.e. IFI, TLI and CFI) exceeded the cut-off of .90, thus indicating an excellent fit. Based on these indices, the model is accepted.

Table 5.19: Model Fit Summary for the chicken and the salad products

	Chicken	***Salad***
Absolute fit index		
CMIN/DF	2.576	2.489
Parsimony-Adjusted Measure		
RMSEA	.059	.057
Comparative Fit indices		
IFI	.964	.968
TLI	.949	.954
CFI	.964	.967

In conclusion, despite the complexity of the model comprising a multitude of latent variables, the measurement model exhibited outstanding overall model fit for the chicken and salad products. Now that the measurement component is deemed consistent with the data, the next step is to analyse the full structural equation model, which is the focus of the next chapter.

Chapter 6 – Hypotheses Testing and Discussion

6.1 Overview

In the previous chapter, the measurement model was tested and model fit modifications were made to establish the proposed model for hypotheses testing. This phase of the thesis is intended to determine the significance of the relationships connecting the factors of trust in the food system and in brands to repurchase intentions and brand loyalty, with consumer confidence in credence attributes acting as a mediator. Accordingly, the Structural Equation Modelling (SEM) output of the model is reported and discussed in this chapter. The full SEM model linking all constructs is broken down into three sub-models to better tackle the model fit. Hence, this chapter is comprised of four sections. Section 6.2.1 examines the postulated determinants of trust in the food system (sub-model 1), while section 6.2.2 analyses the proposed determinants of brand trust (sub-model 2). Section 6.2.3 focuses on the hypothesized drivers and consequences of consumer confidence in food quality and food safety (sub-model 3). Section 6.3 tests the invariance of the structural relationships between the constructs of trust and confidence across groups. The chapter concludes in section 6.4.

6.2 Hypotheses Testing

The structural component of the full SEM illustrates the causal relationships between constructs. The objective of this section is to check the strength of the impact of each path connecting two conceptual variables. Below is a reminder of the hypotheses derived in chapter 2.

H1: Trust in the food system will positively influence consumer confidence in credence attributes.

H2: Brand trust will positively influence consumer confidence in credence attributes.

H3: Trust in the food system will positively influence brand trust.

H4: Perceived competence of the food system will positively influence trust in that system.

H5: Perceived credibility of the food system will positively influence trust in that system.

H6: Perceived benevolence of the food system will positively influence trust in that system.

H7: Perceived reputation of the food system will positively influence trust in that system.

H8: Perceived brand competence will positively influence brand trust.

H9: Perceived brand credibility will positively influence brand trust.

H10: Perceived brand benevolence will positively influence brand trust.

H11 Perceived brand reputation will positively influence brand trust.

H12: Low (high) levels of risk aversion will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

H13: Good (bad) consumers' past experiences will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

H14: High levels of ethical involvement will strengthen the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.

H15: Consumer confidence in credence attributes will positively influence (a) repurchase intentions and (b) brand loyalty.

H16: Trust in the food system will positively influence repurchase intentions.

H17: Brand trust will positively influence brand loyalty.

H18: Repurchase intentions will positively influence brand loyalty.

6.2.1 The Determinants of Trust in the Food System

It is hypothesised that trust in the food system is affected by system competence (H4), system credibility (H5), system benevolence (H6) and system reputation (H7) for which results are displayed in Figures 6.1 and 6.2 below. For chicken, the overall model fit summary shows a CMIN/DF=2.587 indicating that the model fits the data. Similarly, the comparative index CFI=.992 as well as the RMSEA=.059 reflect a good fit. Likewise, the overall model fit for salad is good with CMIN/DF=2.551, CFI=.992 and RMSEA=.058. The statistical significance of the path coefficients between criterion and predictor variables are analyzed individually in the following.

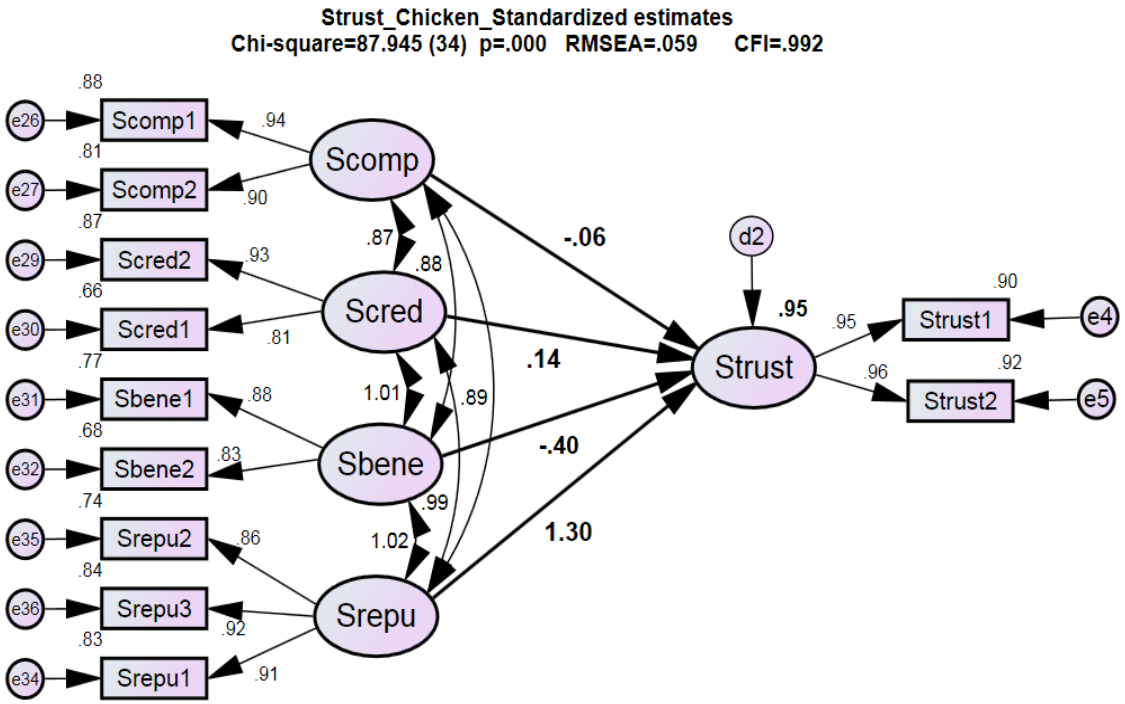

Figure 6.1: SEM of the antecedents of system-based trust: chicken

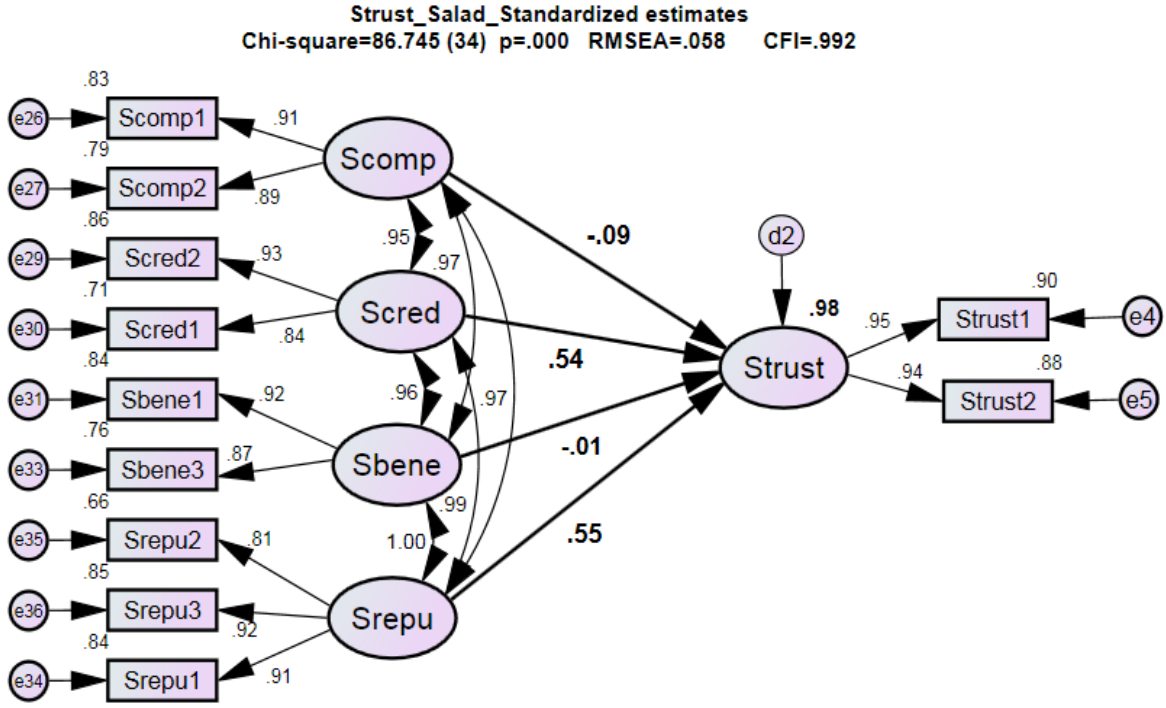

Figure 6.2: SEM of the antecedents of system-based trust: salad

6.2.1.1 Perceived System Competence and Trust in the Food System

For chicken (β_{stand}= -.06, p=.435) and salad (β_{stand}= -.09, p=.537), the standardized path coefficients between system competence (*Scomp*) and trust in the food system (*Strust*) are not significant at the 5% level. This suggests that consumers' perceptions of the competence of the supply chain comprising farmers, government, food processors and retailers is not an influential factor in trusting the food system. This finding rejects the predicted relationship in H4, and it differs from past studies that mostly reported the effect of competence on trust in a particular target (e.g., Frewer et al., 1996; Maeda and Miyahara, 2003; De Jonge et al., 2008b).

There are a number of potential explanations. First, these studies and others show that the dimensions of trust do not contribute equally to explaining consumer trust in institutions. For instance, Sapp et al. (2009) found that the impact of fiduciary responsibility on trust is three times more important than the impact of competence on explaining trust in the U.S. food system. Furthermore, a study by the Center for Food Integrity (CFI) found that shared values (e.g., affordable healthy food, reduced use of natural resources) between consumers and farmers are three to five times more important than demonstrating skills and expertise in building consumer trust in the food chain (The Center for Food Integrity, 2012). Likewise, a study on the impact of trust and food risk communication on consumer behaviour in the EU reveals that sharing public values (integrity) is the best predictor for trust in food actors compared to competence and truthfulness of information (Romano and Stefani, 2006).

The insignificant path between system competence and trust in the food chain may suggest a lack of consumers' awareness about the skills and expertise of the market actors to supply high quality chicken and salad products. Other researchers, however, suggest that Canadians appear to perceive that the different actors are competent regarding their ability to control and guarantee safe food (De Jonge et al., 2008b). Another more likely explanation is that consumers may be confident in the competence of the actors, but they may also feel that these actors are economical with their effort or with the truth, for instance in a situation of a food safety threat, perhaps for public order reasons (Romano and Stephani, 2006). To illustrate, a participant offered the following comment: "The manufacturers, farmers and retailers all have the knowledge to produce quality product, but most of them do not use this knowledge to help the consumer - it is used when it suits to help themselves". Another respondent indicated: "I would start purchasing

these products again if that smell and after taste was gone. I am sure I am not the only one who notices this problem. With the millions of bags you sell every year, I am positive you have had complaints, which tells me you have done nothing about it." These comments suggest that competence by itself may not be a major driver for consumers to trust the food system. In fact, it has been suggested that "expertise and freedom do not lead to trust unless accompanied by other characteristics" (Frewer et al., 1996: 484), and expertise without honesty may not cause long-term changes in attitudes (Eagly, Wood and Chaiken, 1978; Frewer, Scholderer and Bredahl, 2003). In the same vein, Wildavsky and Dake (1990: 54) argue that "it is not knowledge *per se*, but confidence in institutions and the credibility of information that is at issue". Related to this, Yee and Yeung (2010) found that competence affects trust building in livestock farmers indirectly through the provision of trust information. Hence, one can argue that being knowledgeable and expert in managing food quality and food safety does not mean that the system can be completely trusted (Frewer et al., 1996; Van Kleef et al., 2007).

In the current analysis, the correlations between perceived system competence, credibility, benevolence and reputation are greater than .86, indicating a close interrelationship between these constructs. Thus, perceived competence may only be an important antecedent of system trust in the sense of improving the credibility of the food system, its benevolence and its reputation. Stated differently, the issue of institutional trust does not seem to be so much about having the knowledge to guarantee high quality product or the expertise to effectively remove a contaminated product from the market, but about other trust dimensions and/or a combination of them. While this idea does not conform with initial theoretical expectations as well as findings of a number past studies, it is consistent with the results of Selnes (1996) who did not find a significant effect of perceived competence on trust in the context of buyer-seller relationship.

Since increasing knowledge and expertise may not affect how consumers feel about an issue in the absence of dialogue and social networking, communication between consumers and market actors is a key element in gaining public trust (The Center for Food Integrity, 2012). In accordance with studies related to risk communications (e.g., Frewer et al., 1996, Siegrist, 2000; Siegrist, Gutsher and Earle, 2005), the current results support efforts to inform consumers about the ways food is produced and processed. The idea of how the food system performs as a source of information is detailed next.

6.2.1.2 Perceived System Credibility and Trust in the Food System

Despite the multidimensionality of trust, providing credible public information is expected to bolster public trust. According to Sodano (2002: 7), "market failure of high quality products plagued by information problems" is a main issue affecting trust in food quality. If consumers place a value on knowing where the food they purchase comes from and how it is produced and processed, their confidence will remain fragile if market players cannot provide credible information about food provenance and the practices adopted.

The estimated coefficients from perceived system credibility (*Scred*) to trust in the food system (*Strust*) are not significant for chicken (β_{stand}=.14, p=.776) and salad (β_{stand} =.54, p=.109). As such, the results do not validate H5 and are different from extant findings reported in studies that examined credibility of individual food actors (e.g., Frewer et al., 1996; Chen, 2008; Yee and Yeung, 2010). The insignificant finding means that perceived credibility is not a precursor for system-based trust. In other words, consumers may lack information to trust the food system. Related to this, many participants from both samples expressed uncertainty in the free-form comments regarding what happens to food products from farm to fork. For instance, one respondent indicated: "After the farmers sell the produce who knows what happens before it gets to the shelves for sell. It could be good at the time the farmers sell it but what happens after it gets to the store." Another said: "I am extremely disappointed in the food industry for putting profits over consumer's health and safety, companies I have trusted for years I find out now that they have misled or in some cases lied to us in the name of profits for shareholders, we have a right to know if GMO and other things are in our food. The choice should be mine if when presented with this info I choose an organic or GMO free product costing more!" This uncertainty has led some consumers to prepare their own salad instead of buying of a packaged product. For example, one participant said: "I have a salad for lunch every day and I quite often make them from scratch. That way I know what I am getting". Furthermore, many consumers strive to know about the safety of their food: "Now I would like to know exactly how safe my bagged salad is :)", "I love the convenience of pre-washed packaged salad since it saves time and wasted produce. I hope everything is being done to make sure it is safe to consume", and "Now I go into my kitchen and chop up my own veggies. At least I know what's going into my food!" These comments, albeit from a small number of respondents, suggest that there may be a role for

both public and private actors in improving transparent communication about the food system and its practices.

The insignificant relationship between perceived system credibility and trust in the food system, combined with respondents' comments, may suggest that Canadians do not perceive actors within the food chain as sufficiently credible sources of information when it comes to meat and fresh produce. Perhaps, respondents perceive farmers as credible sources but not food manufacturers or retailers. That is, perceptions that one component of the food system is credible may not be sufficient to secure trust in the food system as a whole. For instance, previous research has shown that consumers in some European countries (i.e. U.K, Germany, Italy, France and the Netherlands) perceive consumer organisations and food experts as the most trustworthy when it comes to who they believe will tell the whole truth during a food incident involving chicken, followed by food authorities and the media (Romano and Stefani, 2006). This European study found that market actors, including the food industry and farmers, are least often believed to be truthful (Romano and Stefani, 2006). As such, it could be deduced that consumers often tend to trust unbiased sources of information such as non-government organisations or scientists.

6.2.1.3 Perceived System Benevolence and Trust in the Food System

It is anticipated that consumers in general know that food is not totally risk free. In other words, government, farmers, food manufacturers, and retailers cannot guarantee totally safe food (Ekici, 2004). On the other hand, consumers may have an expectation that every actor along the food chain has an obligation to provide safe and high quality food.

Results indicate that system benevolence is not a significant predictor of trust in the food system for chicken (β_{stand}=-.40, p=.244) as well as for salad (β_{stand}=-.01, p=.991). As such, the finding does not support the argument in H6 that trust in the food chain is influenced by consumers' perceptions of system benevolence. These results differ from previous research on the importance of care for public welfare in enhancing trust in particular agent (s) of the food system (e.g., De Jonge et al, 2008b; Pivato, Minsani and Tencati, 2008; Yee and Yeung, 2010). Indeed, "trust building is suggested to be developed when consumers are aware of suppliers' genuine motives for consumers' interest through past experience or the information provided" (Yee and Yeung, 2010: 155). De Jonge et al. (2008b) conclude that care is the most important

dimension that drives consumers to trust food manufacturers. Not only does the food industry have a legal duty and a moral responsibility to protect consumers, but also it has an interest to promote its own brands and reputation, otherwise it might suffer from severe economic losses. For example, Pivato, Minsani and Tencati (2008) found that Italian consumer perceptions that a company is socially responsible are associated with a higher level of trust in that company and its organic products.

In the free-form comments, many respondents from the chicken survey stressed the importance of benevolent or altruistic conduct: "I firmly believe that chickens should be treated with dignity and have comfortable living conditions. I will not support a company that mistreats the chickens", "I would love that farmers treat chickens humanely", "My biggest concern in poultry, or other meat product is the treatment of the animal from birth to the end. I also look for environmental consideration", and lastly "It would be nice if chicken farmers actually made their process for butchering a little more human (sic)". The insignificant effect of perceived benevolence on trust in the food system may suggest that consumers perceive government as benevolent but not farmers or food industry. That is, one agent may not be sufficient to perceive the food system as benevolent and, ultimately, to trust it.

6.2.1.4 Perceived System Reputation and Trust in the Food System

Results show that system reputation is significantly different from zero for chicken (β_{stand}=1.30, p=.006), thereby supporting the predicted relationship between perceived reputation and trust in the food chain. This finding aligns with previous research on the profound effect of reputation on public trust (Ganesan, 1994; Das and Teng, 1998; Blois, 1999; Puspitawati, 2011). However, H8 is not supported for the salad product (β_{stand}=.55, p=.513). Results from the two surveys therefore suggest that reputation of the food system drives consumers to trust that system for some food products but not for others. That is, reputation may be more important for one food product than another. As such, the discrepancy between results for both products may infer that trust in the food supply chain differs across product categories. This hints that trust is likely to depend on the nature of the food product (meat versus fresh produce). Indeed, chicken and salad differ substantially in terms of preparation and consumption contexts.

For chicken, it appears that perceived system reputation dominates other features of the food system (i.e. credibility, competence and benevolence) in contributing to overall trust. *A priori*, this provides an important managerial implication for food actors who could focus on improving the firm's reputation. This may not apply to the salad product as individually none of the four dimensions were significant. An adaptation of the postulated model is discussed below.

6.2.1.5 Discussion

Although it was thought that looking at the separate effects of competence-, credibility-, benevolence- and reputation-based trust would potentially offer deeper insights in understanding what determines consumer trust in the food system, most of these effects did not confirm prior expectations, in particular for the salad product. A possible explanation of the non-significant paths is the high correlations between the antecedents of trust in the food system that exceeded .85 in Figures 6.1 and 6.2[13]. With a high degree of correlation, it is difficult to determine the individual contribution of each independent variable as their effects are confounded (Hair et al., 2006). As such, there appears to be important content overlap among the items measuring the competence, credibility, benevolence and reputation of the food system. Indeed, the dimensions of trust are highly interrelated as underlined in the theoretical framework.

High correlations between distinct dimensions of trust are not uncommon or novel in the sense that they are recognized in other studies such as in the paper by Colquitt, Scott and Lepine (2007) who found high inter-correlations (>.60) between ability, benevolence and integrity, yet all three exhibit significant and unique relationships with trust. Likewise, Doney and Cannon (1997) found benevolence and credibility to be highly correlated in a commercial setting, which means that, both dimensions "may be so intertwined that in practice they are operationally inseparable" (Doney and Cannon, 1997: 43).

High correlation between factors raises the issue of multicollinearity that arises when two or more variables are so highly correlated that they represent the same underlying construct. As such, multicollinearity makes regression coefficients very small and not statistically different from zero when they should be significant. For instance, the insignificant effect of system competence (*Scomp*) on trust in the food system (*Strust*) suggests that some of the covariance of

[13] Correlations are between -1 and 1, however, "because they are only estimates, it can happen that their absolute value exceeded 1.00" (Kline, 2011: 71)

system competence and trust in the food system might have been explained by other variables (*Scred, Sbene or Srepu)* in the model, leaving an insignificant amount of unique covariance for this path. Stated differently, the non-significant result in terms of direct influence of *Scomp* on *Strust* might be due to co-sharing of covariances in the overall model (Saleh, 2006). To examine this contention, a discriminant validity test was conducted, results of which are portrayed in the tables below.

Table 6.1: Factor correlation matrix with square root of the AVE on the diagonal: Strust in chicken

Strust: Chicken	**CR**	**AVE**	**MSV**	**ASV**	**Convergent Validity CR>AVE AVE>.5**	***Scred***	***Scomp***	***Srepu***	***Sbene***	**Discriminant Validity MSV<AVE ASV<AVE**
System credibility (*Scred*)	0.711	0.517	1.018	0.711	YES	0.719				NO
System competence (*Scomp*)	0.706	0.564	0.799	0.706	YES	0.867	0.751			NO
System reputation (*Srepu*)	1.007	1.030	1.044	1.007	NO	0.987	0.894	1.015		NO
System benevolence (*Sbene*)	0.551	0.537	1.044	0.551	YES	1.009	0.883	1.022	0.733	NO

Table 6.2: Factor correlation matrix with square root of the AVE on the diagonal: Strust in salad

Strust: Salad	**CR**	**AVE**	**MSV**	**ASV**	**Convergent Validity CR>AVE AVE>.5**	***Scred***	***Scomp***	***Srepu***	***Sbene***	**Discriminant Validity MSV<AVE ASV<AVE**
System credibility (*Scred*)	0.823	0.619	0.974	0.930	YES	0.787				NO
System competence (*Scomp*)	0.681	0.543	0.947	0.926	YES	0.948	0.737			NO
System reputation (*Srepu*)	0.884	0.663	0.998	0.973	YES	0.987	0.973	0.814		NO
System benevolence (*Sbene*)	0.695	0.534	0.998	0.949	YES	0.957	0.966	0.999	0.731	NO

CR: Composite Reliability, AVE: Average Variance Extracted, MSV: Maximum Shared Squared Variance, ASV: Average Shared Squared Variance

Convergent validity is "the extent to which the scale correlates positively [and shares variance] with other measures of the same construct", whereas discriminant validity is "the extent to which a measure does not correlate with other constructs from which it is supposed to differ" (Malhotra, 2002: 294). In other words, discriminant validity describes conceptual differences between a construct and another construct. Evidence of discriminant validity exists when the average variance extracted (AVE) is greater than the square of the construct's correlations with the other factors (Fornell and Larker, 1981). Tables 6.1 and 6.2 show that the four antecedents of trust for both products do not comply with this criterion and thus do not exhibit discriminant validity.

Because system competence, credibility, benevolence and reputation were not found to be distinct factors, they were merged into one factor (System Competence Credibility Benevolence Reputation). For ease of wording use, the term 'integrity' is used when the four dimensions of trust are combined. System integrity or *Sintegr* is used here as an "umbrella" term that refers to congruency of actions (competence and reputation) as well as of values (credibility and benevolence), and thus captures how consumers evaluate the food system as a whole.

Before estimating the new reduced model of trust in the food system, highly correlated measures of the construct *Sinteg* were removed to improve model fit. As such, *Scomp2* and *Sbene2* were trimmed from the chicken model, and *Scomp2* and *Sbene3* from the salad model. The final reduced models are portrayed in Figures 6.3 and 6.4 where they exhibit an excellent overall fit (CMIN/DF=1.647, CFI=.997, RMSEA=.037 for chicken; CMIN/DF=1.647, CFI=.997, RMSEA=.037 for salad) as well as a significant path (*Sinteg* → *Strust*: β_{stand}= .99 with $p<.001$).

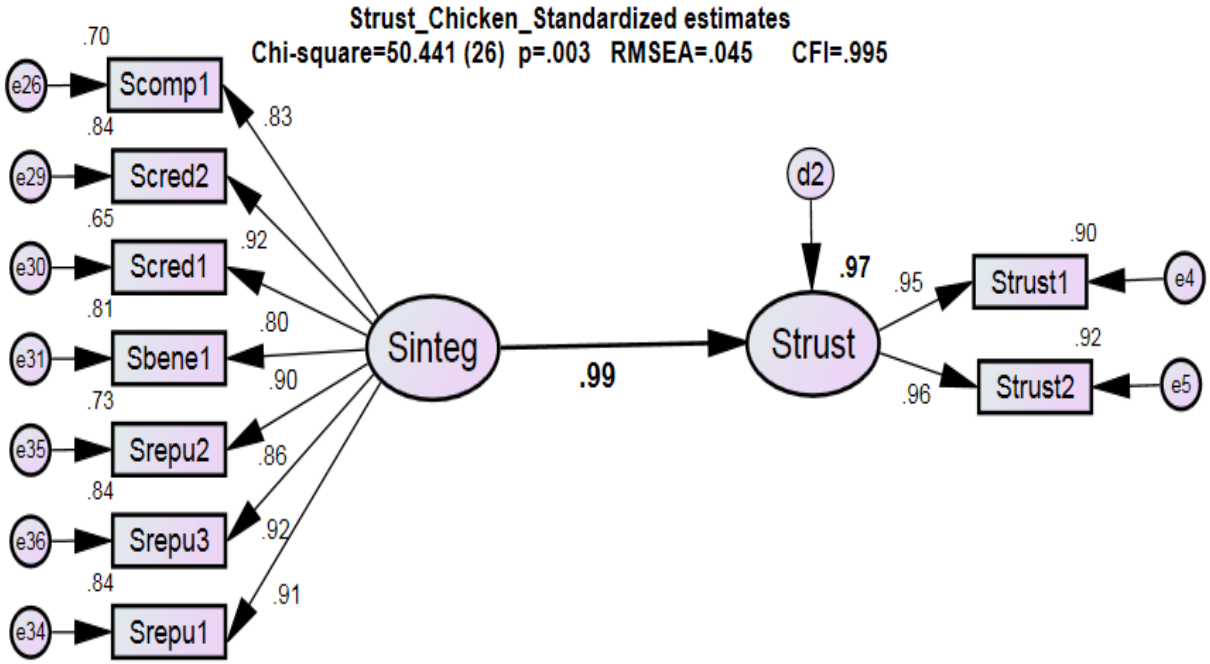

Figure 6.3: Final SEM of the antecedents of system-based trust: chicken

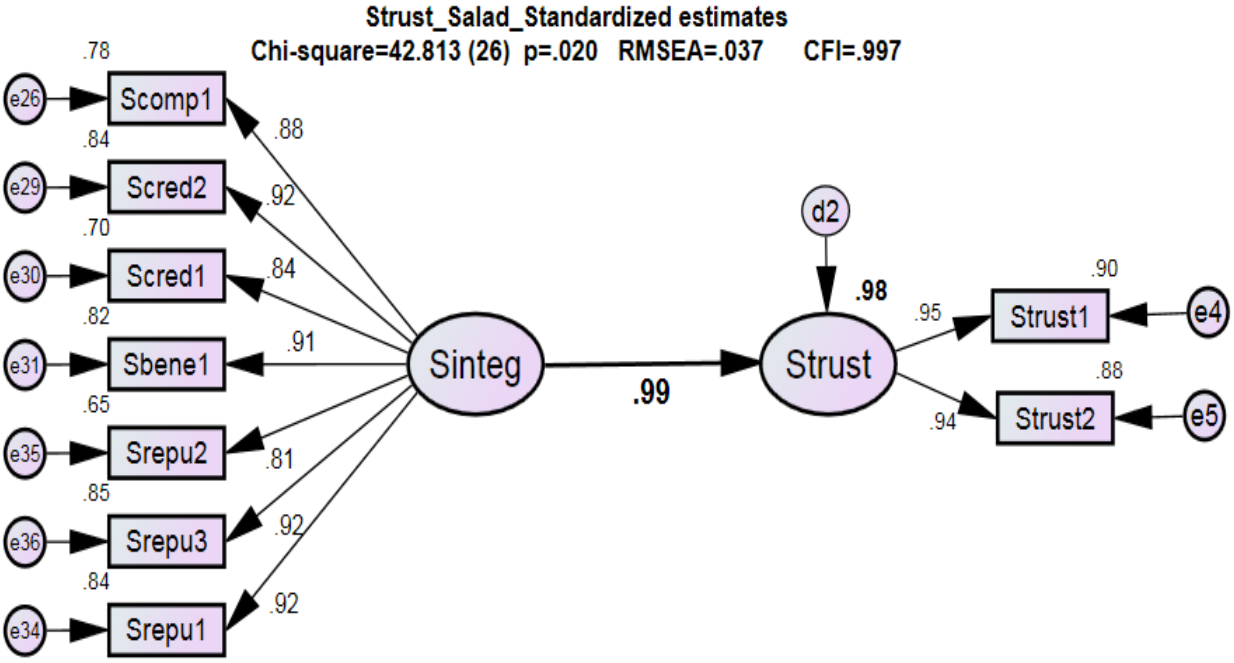

Figure 6.4: Final SEM of the antecedents of system-based trust: salad

To compare the original (four-dimensional) and the reduced (one-dimensional) models of system trust, a chi-square difference test is performed results of which are presented in Table 6.3. For both the chicken and the salad products, the chi-square difference is highly statistically significant, indicating that the model with more parameters and therefore fewer d.f. (reduced model) fits the data better than the model with fewer parameters and therefore more d.f. (original model) (Bollen, 1989; Kline, 2011). In other words, it pays to estimate the additional parameters and to use the reduced model.

Table 6.3: Testing differences in nested chi-square values: system trust model

Chicken		***Salad***	
Original model (Figure 6.1)	*Reduced model (Figure 6.3)*	*Original model (Figure 6.2)*	*Reduced model (Figure 6.4)*
χ_o^2 =87.945	χ_r^2 =50.441	χ_o^2 =86.745	χ_r^2 =42.813
d.f.=34	d.f.=26	d.f.=34	d.f.=26
χ_{diff}^2 =37.504; d.f.= 8; p<0.0001		χ_{diff}^2 =43.932; d.f.= 8; p<0.0001	

The new reduced forms can be interpreted in a way that consumer trust in the food system can be gained when all involved food actors (i.e. government, farmers, food industry) are perceived competent, credible, benevolent and reputable. Indeed, a farmer or a food retailer cannot communicate care and goodwill to consumers, and at the same cheat about the quality or safety of the food products, otherwise his behaviour is seen as opportunistic. As such, a food actor who is benevolent and not credible may be viewed as manipulative. Furthermore, if a consumer detects that a fresh chicken cut or packaged green salad is not *fresh* as labelled or branded from its appearance or smell, the manufacturer's or the retailer's reputation is likely to be at risk since misrepresentation or purposefully reneging on a promise (here freshness) can be viewed as morally wrong. Thus, violations of particular dimensions of trust such as intentional deception could be more damaging than errors due to lack of skills or knowledge (Lewicki and Tomlinson, 2003). Consequently, it is expected that behaviours that are incongruent with consumer expectations are likely to destroy trust. In this context, Singh and Sirdeshmukh (2000) argue that competence without benevolence can have detrimental consequences on overall consumer trust.

A lack of credibility, benevolence, reputation or competence can seriously impair consumer trust regardless of past performance of the market actors. Thus, one can argue that in the context of food, consumer trust could be better established when all dimensions of trust coexist in each actor and mutually reinforce each other. Frewer et al. (1996) show that trust appears to be linked with perceptions of accuracy, knowledge and concern with public welfare. For instance, skills and abilities of the food system to guarantee high quality and safe food may not be enough to drive consumers to trust the food chain. Rather, they should be supplemented by a mutual care for the consumer's wellbeing (Colquit, Scott and Lepine, 2007). Furthermore, a system cannot be perceived as competent overall if one actor is perceived as incompetent. For example, consumers may not be able to trust say manufacturers to assure safe and high quality chicken if the farmers do not supply safe and high quality input or raw material (live birds).

In sum, it appears that a relationship of trust cannot be built on a single block and it cannot be sustained by a single layer. Previous studies have examined trust with separate dimensions and found differences in the strength of the impact of these dimensions (e.g. De Jonge et al., 2008b). The current results suggest that, in the context of this study, different aspects of public trust matter to trust the food system as a whole. As the trust relationship evolves, competence or reputation or benevolence or credibility are necessary yet not sufficient conditions for boosting consumer trust. This could be an important managerial implication for farmers, retailers and the food industry in general, showing that neither dimension is enough by itself to establish overall trust. In other words, consumer trust in the food system is built and maintained when there is a consistency between competence, credibility, benevolence and reputation from downstream suppliers to upstream buyers. This returns to the idea that trust is a multifaceted process comprising many interrelated factors. Therefore, general consumer confidence is likely to be dependent upon joint dimensions of trust in the food system.

6.2.2 The Determinants of Brand Trust

Brand trust was theorized as a variable mirroring a set of predictions involving competence, credibility, benevolence and reputation that a consumer attributes to the brand. The effects of the four antecedents of brand trust are displayed in Figures 6.5 and 6.6 below. Overall model fit shows a CMIN/DF of 3.367 for chicken and of 2.053 for salad, thereby reflecting an acceptable fit with the data. Similarly, the comparative indexes (e.g., CFI=.980 for chicken and

CFI=.992 for salad) reflect a superior fit. The RMSEA is equal to .072 and .048 indicating a tolerable fit for the chicken and salad products, respectively. Statistical significance of the paths is examined in detail below.

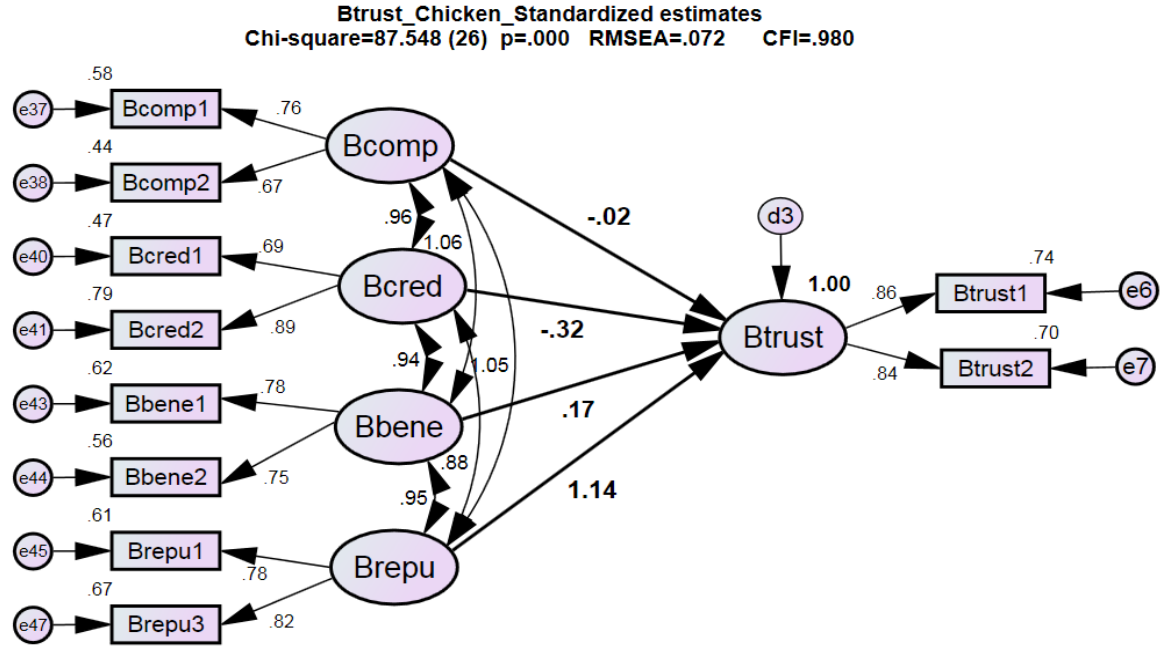

Figure 6.5: SEM of the antecedents of brand-based trust: chicken

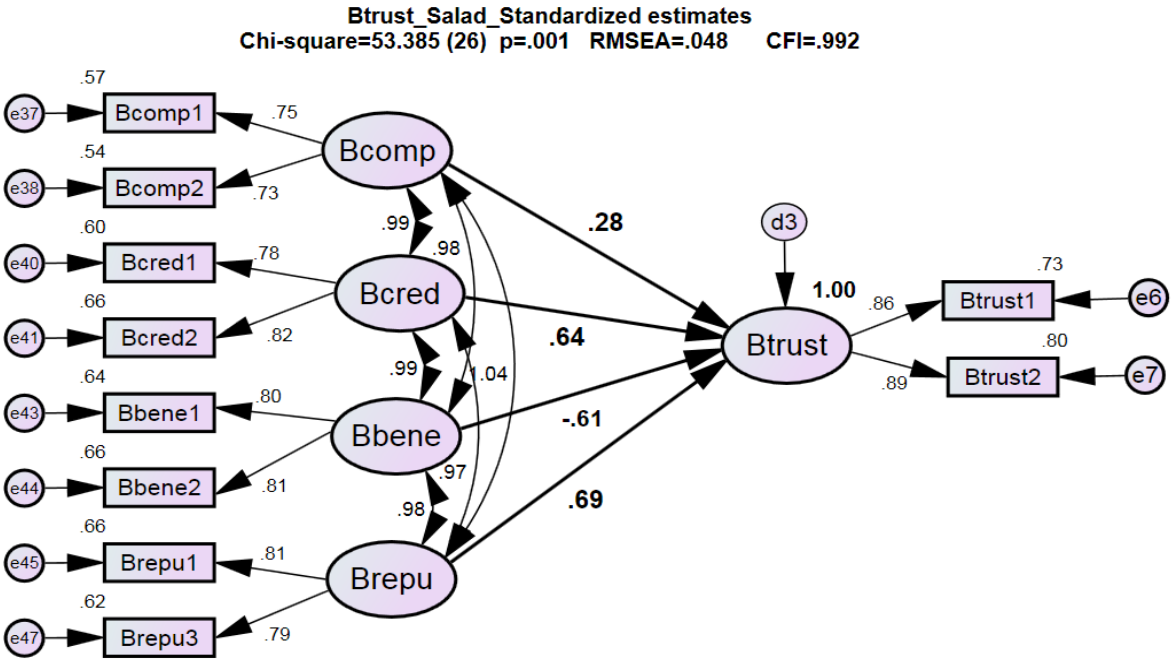

Figure 6.6: SEM of the antecedents of brand-based trust: salad

6.2.2.1 Perceived Brand Competence and Brand Trust

The standardized path coefficients between brand competence (*Bcomp*) and brand trust (*Btrust*) for chicken (β_{stand}=-.02, p=.912) and salad (β_{stand}=.28, p=.537) are not significant for hypothesis H8. This suggests that consumers' perceptions of the competence of food brands in terms of quality and safety do not appear to be an influential factor in trusting these products. These results are at odds with past studies (e.g., Lau and Li, 1999; Afzal et al., 2010). For instance, using US and Chinese respondents, Li et al. (2008) found that competence in addition to benevolence are essential components of brand trust, and each contributes to overall consumer trust in different product categories (detergent, beer, digital camera, laptop computer, car and wireless phone services). Current results suggest that perceived brand competence may not be sufficient to trust a food brand.

6.2.2.2 Perceived Brand Credibility and Brand Trust

The credibility attributed to the brands of fresh chicken and packaged salad products is reflected in the transparency of food quality information and in the perception of the safety of the brand. Contrary to expectations, the data did not provide support to the hypothesized positive relationship between brand credibility (*Bcred*) and brand trust (*Btrust*) for chicken. The result suggests that credibility does not tend to foster consumer trust in chicken brands. The relative narrow market availability of branded fresh chicken (meat is mostly sold unbranded) might be a reason for the insignificant effect of brand credibility on brand trust. In fact, about 30% of the respondents in the survey buy chicken brands, and the remainder, despite not buying brands were asked to give their opinion about chicken brands in general. Perhaps, the result infers that consumers do not see a difference in the credibility between branded and generic products.

The model was re-tested using those respondents who only buy chicken brands (N=141) and those who buy generic versions separately; brand credibility still did not exhibit a significant impact on brand trust for either group. Likewise, the path coefficient between brand credibility and brand trust was not statistically significant (β_{stand}=.64, p=.459) for salad, H9 was not validated; implying that brand credibility is not a predictor of consumer trust for salad brands.

The insignificant result contrasts with the *a priori* theoretical argument that the credibility dimension is important for consumers to enhance their trust in brands, and with previous studies

albeit from different contexts (e.g., Gurviez and Korchia, 2003; Ha, 2004; Erdem, Swait and Vanenzuela, 2006). For instance, Gurviez and Korchia (2003) found the influence of credibility on trust to be five times greater than the impact of benevolence or integrity on trust when testing a model of consumer-brand relationship on a sample of 389 Parisian students using the *Nutella* brand (a nut-based chocolate spread). Using data on orange juice and personal computers collected from respondents in Brazil, Germany, India, Japan, Spain, Turkey, and the U.S., Erdem, Swait and Velenzuela (2006) found strong evidence for the positive effect of brand credibility on brand choice. Their results show that credible brands as signals of product positions provide more value, in particular in contexts of high uncertainty[14] because such brands have lower perceived risk and information costs. In fact, Erdem, Swait and Valenzuela (2006: 37) argue that "consumers from high-uncertainty-avoidance cultures may use brands as signals more than consumers from low-uncertainty-avoidance cultures." That is the role of a brand's credibility is especially effective when consumers are more averse to risky choices (Erdem and Swait, 1998).

The fact that the majority (70%) of the Canadian sample in the dataset exhibited low levels of risk aversion is a likely reason for the insignificant path between brand credibility and consumer trust in brands. Indeed, this thesis is not tied to a specific context (i.e. food safety event), rather it examines the credibility of brands during the course of normal consumption. Thus, consumers are concerned about production-related features beyond specific food safety events in standard situations (Drescher et al., 2011). Based on this reasoning, results indicate that credibility as a stand-alone aspect of brand trust may not be sufficient to establish overall trust in brands. Other antecedents of brand trust are discussed next.

6.2.2.3 Perceived Brand Benevolence and Brand Trust

For salad, results indicate that brand benevolence (*Bbene*) is not a significant predictor of brand trust (*Btrust*) (β_{stand}=-.61, p=.464). This finding rejects the hypothesis in H10 that brand trust is influenced by consumers' perceptions of brand benevolence for the salad product. Likewise, brand benevolence is not a significant driver for brand trust for chicken (β_{stand}=.17, p=.678). These results contrast findings in some extant studies from food and non-food contexts

[14] The authors used "uncertainty avoidance" as an important cross-cultural construct that moderates their postulated relationships.

(e.g., Gurviez and Korchia, 2002; Li et al., 2008). The current results indicate that perceived brand benevolence is not a driving factor of consumer trust in brands of chicken and packaged salad. Perhaps, consumers do not perceive that the brands they buy enhance their well-being in terms of nutrition and health, or that they are produced in a socially- and environmentally-friendly manner. The fact that the thesis looks at perceptions of a set of brands (national brand names, store labels) together rather than perceptions of a particular brand could be another explanation. Perhaps benevolence is important for one brand and not for another. Related to this, Ulusu (2011) found that three leading brands of tea in Turkey have different impacts on "fiability" and "intentionality" dimensions. Explicitly, the author found that *Lipton* has higher "fiability" and "intentionality" than *Çaykur* and *Doğadan*. It is deduced that brand trust is likely to be brand-specific within the same product category.

6.2.2.4 Perceived Brand Reputation and Brand Trust

For the hypothesised relationship between brand reputation (*Brepu*) and brand trust in chicken, the estimated path coefficient (β_{stand}=1.29, p<.05) is in the predicted direction and significant, thus it provides strong support for H11. This confirms that a stronger reputation surrounding a particular brand of chicken has a positive impact on public tendencies to trust that brand. Yet, the influence of brand reputation on brand trust was not significant for salad (β_{stand}=.69, p=.120). The current finding relative to the chicken product is compatible with past studies on the importance of brand reputation in developing consumers' trust in a brand (e.g., Lau and Lee, 1999; Afzal et al., 2010). For instance, Afzal et al. (2010) found that brand reputation increases consumer trust in brands by 30%. On the other hand, current results suggest that a damage to brand reputation is likely to impair consumers' trust in chicken brands as well as to undermine a firm's intentions to maintain good relationships with consumers. Thus, an implication for market actors, in particular meat manufacturers and retailers, is being aware of the importance of the reputation of their products and taking proactive steps to promote a good image to consumers.

6.2.2.5 Discussion

It was expected that each of the elements of brand competence, credibility, benevolence and reputation would contribute to overall consumer trust in brands. Individually none of these dimensions was a significant precursor for brand trust in the case of bagged salad brands, and

only brand reputation was statically significant for chicken. A look at the correlations between the antecedents of brand trust reveals that they are very high – exceeding .90 for both products, which may signal definitional overlap of concepts. In other words, the four antecedents of brand trust appear to be quite similar, which may explain why the model did not perform well in terms of testing the hypothesized relationships. The notion of highly correlated aspects of a brand has been recognized in some studies on brand, for example by Li et al. (2008) who found that both dimensions of overall brand trust (i.e. brand competence and benevolence) to be highly correlated and yet significant. In this analysis, the insignificance of the relationships raises the question of whether the four constructs are distinct entities. To answer the question, a post-hoc test of discriminant validity is conducted, results of which are presented in the tables below.

Table 6.4: Factor correlation matrix with square root of the AVE on the diagonal: Btrust in chicken

Btrust: Chicken	**CR**	**AVE**	**MSV**	**ASV**	**Convergent Validity CR>AVE AVE>.5**	***Bcred***	***Bcomp***	***Brepu***	***Bbene***	**Discriminant Validity MSV<AVE ASV<AVE**
Brand credibility (*Bcred*)	0.490	0.454	0.927	0.864	NO	0.674				NO
Brand competence (*Bcomp*)	0.500	0.341	1.126	1.049	NO	0.963	0.584			NO
Brand reputation (*Brepu*)	0.948	0.862	1.094	0.926	YES	0.885	1.046	0.929		NO
Brand benevolence (*Bbene*)	0.615	0.400	1.126	0.969	NO	0.939	1.061	0.949	0.633	NO

Table 6.5: Factor correlation matrix with square root of the AVE on the diagonal: Btrust in salad

Btrust: Salad	**CR**	**AVE**	**MSV**	**ASV**	**Convergent Validity CR>AVE AVE>.5**	***Scred***	***Scomp***	***Srepu***	***Sbene***	**Discriminant Validity MSV<AVE ASV<AVE**
System credibility (*Scred*)	0.789	0.557	0.978	0.962	YES	0.746				NO
System competence (*Scomp*)	0.633	0.396	1.071	0.999	NO	0.988	0.629			NO
System reputation (*Srepu*)	0.807	0.583	1.071	0.990	YES	0.966	1.035	0.764		NO
System benevolence (*Sbene*)	0.432	0.560	0.978	0.965	NO	0.989	0.975	0.983	0.748	NO

The results of the discriminant validity test show that the four constructs in each sample are not too different from each other, thus they were merged into one factor named brand performance or *Bperf* as displayed in Figures 6.7 and 6.8. The descriptor performance is used as an umbrella term that refers to how consumers evaluate a brand in terms of perceived quality and safety. It captures the interactive effect of consumer perceptions of brand reputation, competence, credibility and benevolence in shaping attitudes toward a brand.

When estimating the new reduced model of brand trust, the model fit was excellent for salad with CMIN/DF=1.987, CFI=.990, and RMSEA=.046. For chicken, the construct *Bperf* was refined by removing highly correlated measures (*Bcomp2*, *Brepu1* and *Bcred1*) then estimated. The final model exhibited a good overall fit (CMIN/DF=2.589, CFI=.997, RMSEA=.059). Furthermore, brand performance shows a positive and significant influence on brand trust for chicken (β_{stand}=.94, p<.05) as well as for salad (β_{stand}=.99, p<.05).

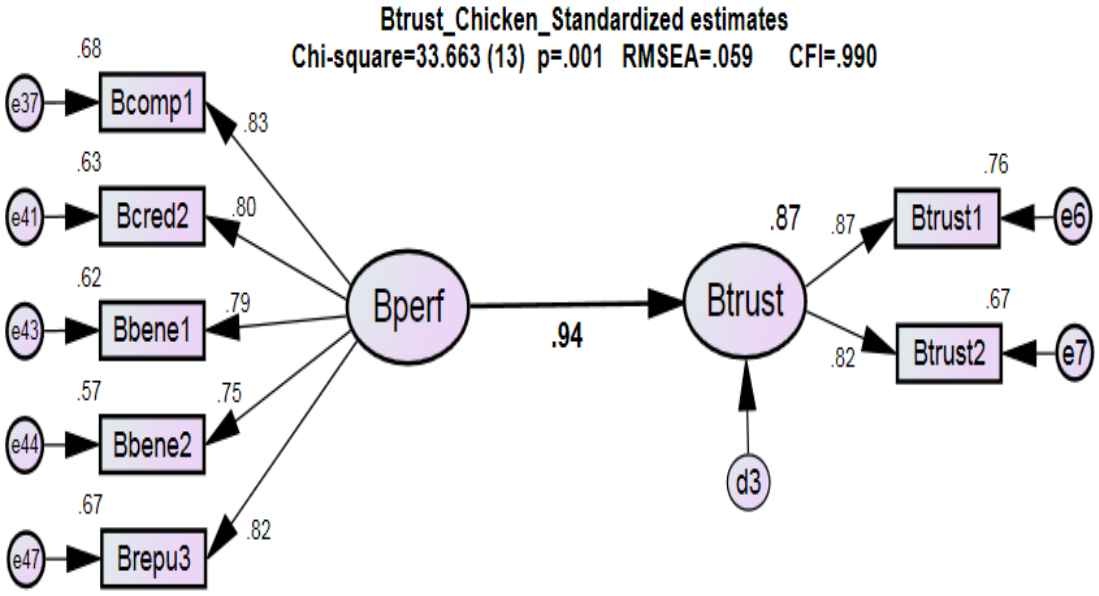

Figure 6.7: Final SEM of the antecedents of product-based trust: chicken

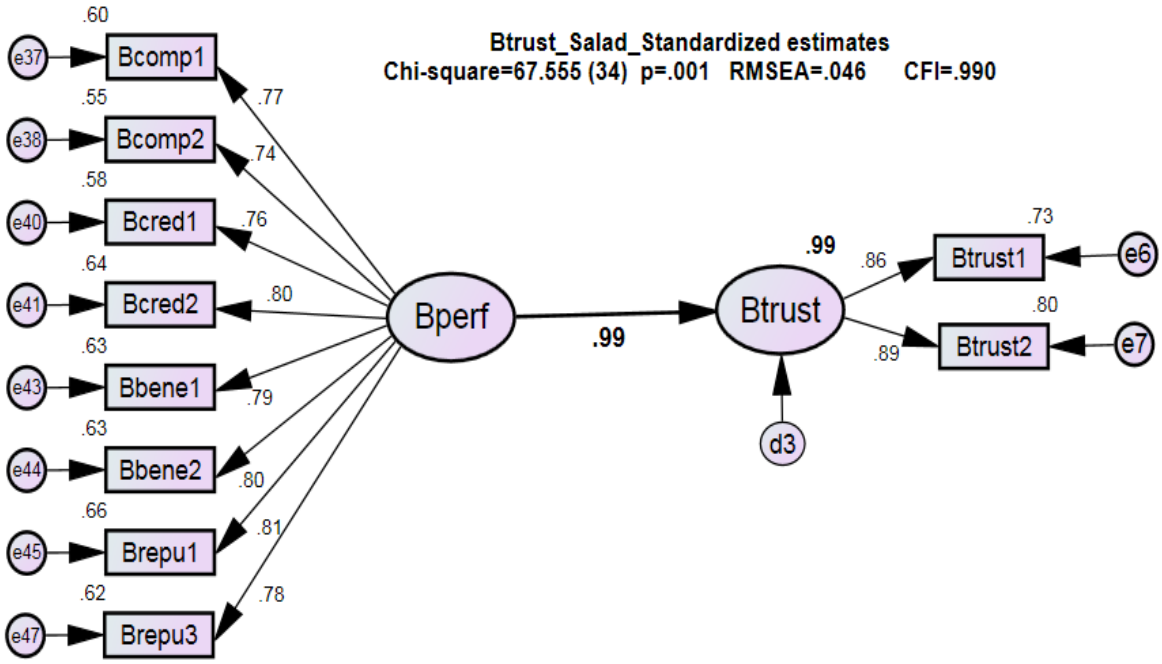

Figure 6.8: Modified SEM of the antecedents of product-based trust: salad

The comparison between the original and the reduced models of brand trust for chicken yielded a significant chi-square difference as portrayed in Table 6.6. As such, the one-factor model of brand trust fits the data better than the four-factor model. For salad, the χ^2_{diff} is not significant at the 5% level, meaning that both models fit equally well statistically. This implies that the more parsimonious model (i.e. one-factor model) explains the data equally well compared to the fuller model and is accepted.

Table 6.6: Testing differences in chi-square values: brand trust model

Chicken		***Salad***	
Original model (Figure 6.5)	*Reduced model (Figure 6.7)*	*Original model (Figure 6.6)*	*Reduced model (Figure 6.8)*
χ^2_o =87.548	χ^2_r =33.663	χ^2_o =53.385	χ^2_r =67.555
d.f.=26	d.f.=13	d.f.=26	d.f.=34
χ^2_{diff} =53.885; d.f.=13; p<0.0001		χ^2_{diff} =14.17; d.f.=8; p=.07	

The new reduced models of brand trust can be interpreted as follows: consumers tend to trust brands of chicken and packaged salad when these brands are perceived as high quality, are backed by credible information, have a good reputation and, at the same time, enhance

consumers' welfare. These are inter-related aspects of brand performance. In fact, a brand may not be perceived as high quality and safe to eat (brand competence) without containing transparent information signalling its quality and safety (brand credibility). One respondent said: "I worry that information is not always fully disclosed to the consumer - i.e. how food is raised (hormones, antibiotics, chemicals, fertilizers), or how food is manufactured - i.e. that chicken may be rinsed in a bleach solution. I have also witnessed that retailers are not always following best practices and that money is sometimes greater than the consumer well-being - i.e. items left on shelf past expired date - sometimes by accident (?) or even deliberately on sale for quick sell-off. Leaves a customer a little weary and concerned about the quality of our food, and we must always be aware consumers - not trusting!" This comment suggests if a consumer has a bad experience with a fresh packaged branded product salad or chicken, such as the product failing to meet a consumer's expectations of product freshness, it is likely that this consumer will easily switch to another brand or product (e.g., generic lettuce, frozen chicken) in a subsequent purchase decision. Indeed, about 30% of respondents from both samples indicated that they had switched away from a particular brand due to quality or safety problems (reasons for switching were provided in section 4.3.3).

The holistic approach adopted might be another possible explanation for the insignificant individual effects for the hypotheses. The model analyzes data on consumers' perceptions regarding a mixture of brands (national brands, private labels), rather than perceptions of a particular brand. Since consumers are expected to perceive brands differently, an attempt was made to apply the model of brand trust to the most popular chicken brand among respondents (i.e. *Maple Leaf Prime*). However, the model did not converge to a proper solution, probably due to the small sample (N=40).

Summing up, consumers are looking for healthy food and are thirsty for accurate information about the way food is handled from farm to fork. These consumers' expectations can be met when the food system and the food products are jointly perceived as competent, credible, benevolent and reputable. The current findings support the debate that the breakdown of the concept of trust remains unsolved in the social sciences. Rather than conceptually distinct, the results suggest that the dimensions of trust either in the food system or in individual food products "are operationally inseparable" (Doney and Cannon, 1997: 43). The notion of

interrelated dimensions of trust has been recognized by a few marketing researchers who have conceptualized inter-personal trust as one-dimensional (Larzelere and Huston, 1980; Morgan and Hunt, 1994; Fournier, 1994). In the context of the analysis conducted for this thesis, it appears that trust in food brands and in food in general could indeed be measured by a one-dimensional scale encompassing a number of facets (competence, credibility, benevolence and reputation) rather than by separable dimensions.

After analyzing the sub-models on the hypothesized drivers of the system- and brand-based trust, the next section explores how these two constructs influence overall consumer confidence in food attributes, and ultimately, repurchase intentions and brand loyalty.

6.2.3 The Drivers and Consequences of Consumer Confidence in Food

Since consumers cannot easily observe credence attributes, they may rely on a supplier and/or brand to deliver the expected quality. Thus, consumer confidence in credence attributes was conceptualised as the degree to which consumers perceive the food system (i.e. government, food manufacturers, farmers and retailers) and food brands (i.e. fresh chicken meat and packaged green salad) as trustworthy. Stated differently, both trust in the food actors and brand trust are expected to contribute to consumer confidence in food quality attributes, and ultimately, influence repurchase intentions and brand loyalty. These relationships are portrayed in Figures 6.9 and 6.10 and are analysed individually below. Overall, the model fit is satisfactory (RMSE=.050, CFI=.984 for chicken; RMSE=.042, CFI=.988 for salad), thereby confirming that the proposed network of relationships in which consumer confidence is embedded fits the data.

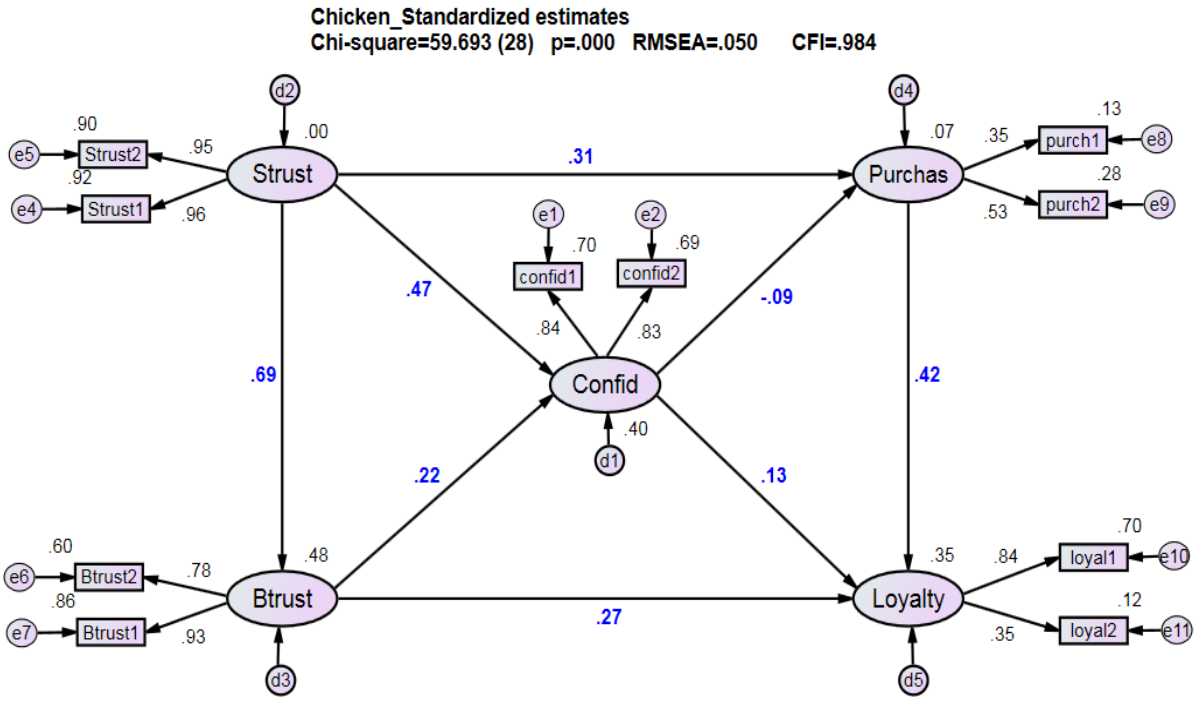

Figure 6.9: SEM of the drivers and consequences of confidence: chicken

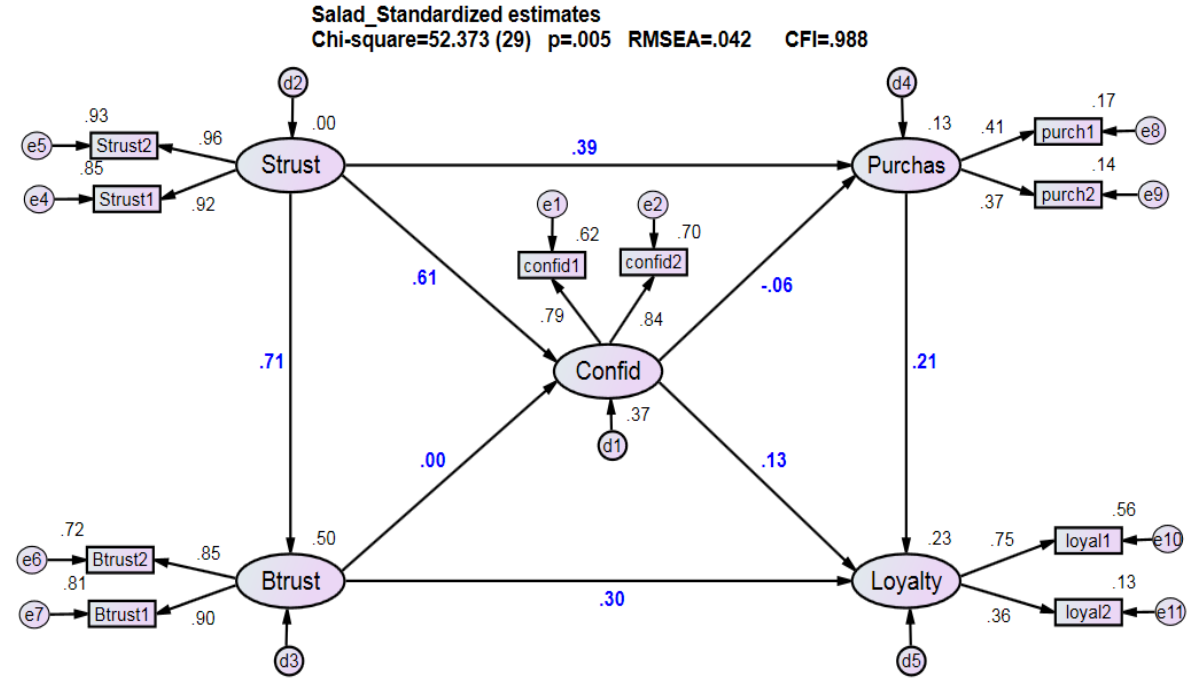

Figure 6.10: SEM of the drivers and consequences of confidence: salad

6.2.3.1 Trust in the Food System and Consumer Confidence

Is it possible that consumers are confident in the food they eat, yet they mistrust some institutions responsible for supplying high quality and safe food? (Ekici, 2004). According to the current findings, the answer to the question is "No". In fact, results provide strong support for the hypothesized relationship (H1) between confidence in credence attributes (*Confid*) and trust in the food system (*Strust*) for chicken (β_{stand}=.47, p<.05) and salad (β_{stand}=.61, p<.05). That is, when *Strust* goes up by 1 standard deviation, *Confid* goes up by 0.47 standard deviations for chicken, suggesting that a higher degree of trust in market actors tends to make consumers feel more confident about fresh chicken. For salad, one standard deviation in *Strust* is associated with a .61 standard deviation increase in *Confid*, indicating that the more consumers confer trust in actors of the food chain, the more confident they are about the quality of packaged salad.

Not only is the result consistent with the hypothesized assertion, but it also lends support to extant findings reported from different studies in the food context, showing that a higher level of institutional trust is associated with higher levels of confidence in food (e.g., Berg, 2004; De Jonge et al, 2004; De Jonge et al., 2006; De Jonge et al., 2008b). According to De Jonge et al. (2004: 840), "trust in regulators and actors in the food chain is a minimum requirement for confidence in the safety of food, assuming such trust is one of the mechanisms by which confidence is created and sustained." On the other hand, the current result suggests that when trust in the food system is damaged, it may erode consumer confidence in credence qualities. Many examples of the consequences of past and recent food safety events can be highlighted. For instance, BSE or so-called "Mad Cow" disease during the 1990s was a pivotal point in the loss of confidence in public and private bodies among many European consumers. It has been suggested that the lack of confidence in beef was connected to mistrust in the British government (Kjærnes, Harvey and Warde, 2007).

6.2.3.2 Brand Trust and Consumer Confidence

While the hypothesized relationship between brand trust (*Btrust*) and confidence (*Confid*) is confirmed for chicken (β_{stand}=.22, p=.002), it is rejected for salad (β_{stand}=0, p=.987). The finding reveals that a higher degree of trust in chicken brands tends to increase consumer confidence in the quality and safety attributes of chicken. This result aligns with those of Bredhal (2003) who shows, in an analysis of the use of quality cues with regard to branded beef,

that brand is the predominant quality signal for consumers to form expectations about the healthiness and the eating quality of unprocessed meat brands. However, the present results suggest that consumers' trust in salad brands is not a significant predictor for confidence in food attributes. This means that degree to which trust in brands influences consumer confidence depends upon the category of the food product (meat versus produce) and perhaps on the range of the brands available on the market. Potential explanations of the variability in results are further explored in Chapter 7.

A comparison between the effect of *Strust* (β_{stand}=.47) and *Btrust* (β_{stand}=.22) on *Confid* in chicken indicates that the impact of trust in the food actors as a group is twice the effect of brand trust. As such, consumer trust in the food system appears to be more influential in leading to confidence in credence attributes than trust in individual food products. While brands as signalling mechanisms are useful, perhaps trusting them is not sufficient for consumers to make confident expectations about credence qualities and may not work for every food category. According to Singh and Sirdeshmukh (2000), as the relationship between a consumer and an agent evolves (through repetitive purchase), consumers rely more on trust expectations than on the provided signals (e.g., brands) and premiums to judge product quality. Furthermore, the authors speculate that "for ongoing exchanges, the trust mechanism for affecting performance expectations and price perceptions will be increasingly more prominent relative to the influence of signaling investments and price premiums established by market agents" (Singh and Sirdeshmukh, 2000: 164).

6.2.3.3 Trust in the Food System and Brand Trust

Results from both products indicate that trust in the food system (*Strust*) has a positive and significant impact on brand trust (*Btrust*), which supports H3. Furthermore, the magnitude of the influence is about the same for either product: β_{stand}=.69 with $p<.05$ for chicken, and β_{stand}=.71 with $p<.05$ for salad. This infers that increased trust in the actors within the food supply chain fosters consumer trust in food brands, regardless of the type of product. In fact, previous work suggests that most Canadians assume that production standards and practices adopted in the Canadian system adhere to strict guidelines that are well enforced, allowing them to some extent to have confidence in food (AAFC, 2007).

6.2.3.4 Repurchase Intentions and the Trusting Constructs (*Confid, Strust*)

As theorised, the path coefficient for hypothesis H16 is significant for both chicken (β_{stand}=.31, p<.05) and salad products (β_{stand}=.39, p=.002), suggesting that trust in the food system (*Strust*) positively influences repurchase intentions (*Purchas*). This yields support to a number of previous studies reporting that trust in market actors such as retailers (e.g., Macintosh and Lockshin, 1997) or farmers (e.g., Yee, 2002) enhances repurchase intentions. For instance, in an EU project on "Food Risk Communication and Consumers' trust in the Food Supply Chain", Cavicchi et al. (2005) found that safety information provided by food chain actors (farmers, processors, retailers) has a very large positive impact on purchase intentions for chicken meat in Italy and France. Likewise, Yee (2002) shows a significant and positive causal relationship between consumer trust in livestock farmers and their likelihood of purchasing meat.

Unexpectedly, the influence of confidence (*Confid*) on repurchase intentions is not significant for either chicken (β_{stand}=-.09, p=.421) or salad (β_{stand}=-.06, p=.673), which does not validate H15a. This reveals that positive repurchase intentions are better explained by trust in the food system rather than by confidence in credence attributes. Perhaps for consumers who are uncertain about the overall quality of the food products, trusting the food system appears to be more important than trusting food products.

6.2.3.5 Brand Loyalty and the Trusting Constructs

The direct path coefficient between brand trust (*Btrust*) and brand loyalty (*Loyalty*) reveals significant support for H17 for chicken (β_{stand}=.27, p<.05) and salad (β_{stand}=.30, p<.05). The result implies that trusting a brand tends to be an influential factor in establishing brand loyalty. The finding aligns with many previous marketing studies. For instance, Chaudhuri and Holbrook (2001) found a strong positive relationship between brand trust and brand loyalty (purchase loyalty and attitudinal loyalty) based on a data set of 107 brands of 41 different product categories (ice cream, cheese, cereal, bacon, canned fruit, perfume, computers, gasoline, etc.).

The effect of consumer confidence (*Confid*) on brand loyalty (*Loyalty*) was not significant for either chicken (β_{stand}=.13, p=.091) or salad (β_{stand}=.13, p=.085). This hints that *Confid* is a not an important predictor for brand loyalty for the produce and meat categories,

thereby rejecting the postulated relationship of H15b. The finding suggests that confidence in food quality and food safety may be not sufficient to secure brand loyalty, a result supported also by Tan, Hishamuddin and Devinaga (2011) in the context of fast food brands. As such, it appears that loyalty does not flow automatically from confidence in individual brands.

Despite the difference in proportions of brand shoppers in both samples (30% buyers of branded chicken against 70% buyers of branded packaged salad), the non-significant result may suggest that there is no difference in confidence in generic or branded food. Perhaps loyalty to a particular food product does not necessarily imply that the product should be branded. With stores such as Superstore that sell the same product (say chicken) under branded and generic versions, it may be that many consumers do not perceive significant differences between store brands or generic versions (at least for fresh food), so choosing any version (i.e. branded or generic raw chicken) could be the same for them.

6.2.3.6 Repurchase Intentions and Brand Loyalty

The relationship between repurchase intentions (*Purchas*) and brand loyalty (*Loyalty*) is corroborated for chicken (β_{stand}=.42, p=.004), but not for salad (β_{stand}=.21, p=.162). This result infers that repurchase intentions enhance consumers' commitment (loyalty) to a particular brand of chicken but not to salad brands. The finding relative to the chicken product is in line with a number of studies within both food and non-food contexts. For instance, Gogoi (2013) found that purchase intentions have a significant impact on the development of brand loyalty for a private label in the Apparel industry. The difference in results suggests that purchase and loyalty in the food context vary among product categories. While not directly explored in the survey, if a consumer does not intend to repurchase the same brand of salad, that does not necessary mean that brand may not be of higher quality. Perhaps, the consumer may want to try new alternatives.

Synthesis

The significance of the structural relationships of sub-model 3 is summarized in Table 6.7 that shows all relationships are supported for chicken except for H15, and four paths are not supported for salad. For both products, trust in the food system enhances overall consumer confidence in food, contributes to brand trust, and leads to positive repurchase intentions. Moreover, consumer confidence is not a predictor either for repurchase intentions or for brand

loyalty for the chicken and the salad products. The effect of brand trust on brand loyalty is supported for both products. Nevertheless, trust in chicken brands contributes to building consumer confidence, which is not the case for packaged green salad. Similarly, repurchase intentions leads to brand loyalty for chicken but not for salad. The discrepancy between results across both products suggests that the characteristics of a food product category may influence brand-level effects such as brand trust and brand loyalty.

Table 6.7: Summary of the significance of the structural relationships

Hypothesized paths	Chicken	Salad
H1: System trust → Consumer confidence	Supported	Supported
H3: **Brand trust → Consumer confidence**	**Supported**	**Not supported**
H3: System trust → brand trust	Supported	Supported
H15a: Consumer confidence → Repurchase intentions	Not supported	Not supported
H15b: Consumer confidence → Brand loyalty	Not supported	Not supported
H16: System trust → Repurchase intentions	Supported	Supported
H17: Brand trust → Brand loyalty	Supported	Supported
H18: Repurchase intentions → Brand loyalty	**Supported**	**Not supported**

6.3 Multigroup Moderation Analysis

A number of consumer characteristics could moderate the trust-confidence link. These include intrinsic characteristics (i.e. risk aversion, past experience and ethical behaviour) and extrinsic characteristics (i.e. gender, age, education, presence of children and income level). That is, the strength of the relationship between trust (either in the food system or in brands) and confidence in credence attributes may be contingent on the levels of risk aversion, on gender, education, etc.

Moderator effects can be assessed either by moderated regression analysis (e.g. Baron and Kenny, 1986) or by multiple-group analysis (e.g. Homburg and Giering, 2001). Tests of continuous moderator variable effects can be performed using interaction effects within the SEM. Tests of discrete (categorical) moderator variable effects can be achieved by utilizing the moderator to divide the sample into sub-groups and performing a chi-square test of the significance of the difference between designated structural parameters across groups (Sauer and

Dick, 1993). Furthermore, when relationships among latent constructs are considered, a multiple-group analysis is the appropriate method (Homburg and Giering, 2001). As such, a multigroup analysis is conducted to test the equivalence (i.e. invariance) of paths among the constructs of trust and confidence across groups of interest (e.g., women versus men). Structural invariance means that the paths connecting the constructs perform in the same way for each group under study. Thus, the objective in testing for equivalence is to determine whether a model can be duplicated across different groups.

The approach adopted is to test structural invariance between a baseline model for all groups and a constrained model where the paths are set to be equal between the groups. If the chi-square difference statistic is not significant, it is concluded that the structural model is equivalent between the calibration (e.g. women) and the validation (e.g., men) samples, and therefore the model is cross-validated (Garson, 2012). On the other hand, if the original and restricted models are significantly different, one can deduce the existence of a moderating effect on the causal relationships in the model, and that effect varies by group (Garson, 2012). The baseline model subject to the multigroup invariance test is displayed in Figure 6.11. Since comparison of structural relationships is of primary interest here, it is presumed that the measurement component operates in the same way between different groups, and that the underlying construct (i.e. trust and confidence) being measured has the same theoretical structure for each group (Byrne, 2004). Furthermore, it is broadly recognized that testing for the invariance of error parameters (e.g., error variances and covariances) is of least importance and may lead to a very restrictive assessment of the data (Bentler, 2005; Byrne, 2004). Therefore, both paths (i.e. *Strust→Confid* and *Btrust→Confid*) are tested for structural invariance for chicken and only *Strust→Confid* is examined for salad since the path *Btrust→Confid* was not significant (see section 6.2.3.2).

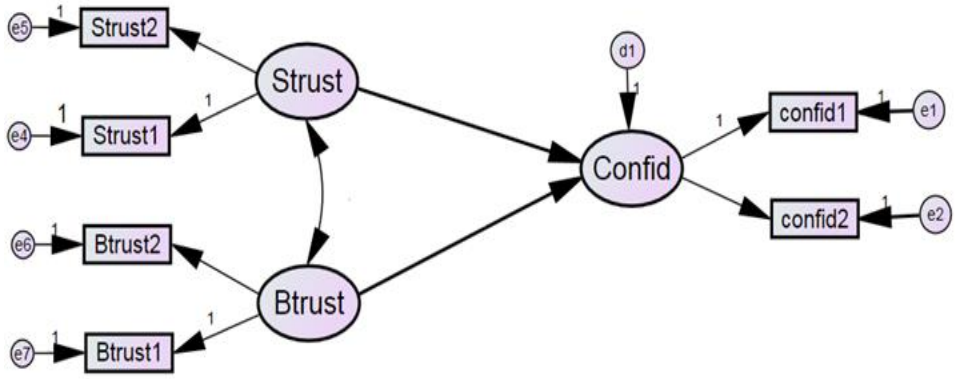

Figure 6.11: Baseline model for a single group analysis

6.3.1 The Effect of Gender on the Trust-Confidence Link

In this section, a test of invariance is conducted to detect whether the model in Figure 6.11 is consistent across male and female respondents. For chicken, the path *Btrust→Confid* was significant for women (57% of the sample) (β_{stand}=.209, p=.023) but not for men (β_{stand}=.181, p=.140). This deviation suggests that female respondents rely more on brands as important quality cues to have confidence in credence attributes, which is not the case for male respondents. Table 6.8 shows the effect of system trust on confidence where comparison of both original (RMSEA=.048, CFI=.997) and constrained-equal (RMSEA=.058, CFI=.994) models yields a χ_1^2 difference value of 4.323 which is statistically significant (p=.038). Therefore, the effect of trust in the food system on confidence varies between females and males within the survey sample. Indeed, the unconstrained regression coefficients for this path are .54 for females and .71 for males, indicating that male respondents tend to have higher trusting perceptions than female respondents. Hence, it is deduced that trust in the food system and food products differs across gender.

Table 6.8: Test of invariance on gender effect

	χ^2		*df*		*p-value*		*Invariant?*	
	Chicken	***Salad***	***Chicken***	***Salad***	***Chicken***	***Salad***	***Chicken***	***Salad***
Unconstrained model	8.273	6.862	4	6				
Constrained model	12.596	7.856	5	7				
Number of groups			2	2				
Difference	4.323	.994	1	1	.038	.319	**NO**	**YES**
Chi-square thresholds (90% confidence)	10.98	9.57	7	7	**.100**	**.100**		

For salad, the χ_1^2 difference between the original (RMSEA=.018, CFI=.999) and the constrained (RMSEA=.016, CFI=.999) models is equal to .994 which is not statistically significant (p=.319). As such, there is no gender difference among survey respondents with regards to trusting beliefs toward packaged salad. Indeed, the estimated path coefficient between *Strust* and *Confid* is .58 for females and .63 for males in the original model, suggesting that the influence of trust in the food system on confidence in the attributes of bagged salad is not significantly influenced by gender.

While previous studies found that gender matters in risk perceptions and in building trust, with women expressing more concern than men (e.g., Siegrist, 1998), other studies found mixed results. For instance, Siegrist, Gutsher and Earle (2005) found that gender is a significant predictor for technological hazards, but not for non-technological hazards. Similarly, the current results suggest that the effect of trust on confidence in food attributes varies across gender as well as across food product categories. While gender did not have any moderating effect for salad, its effect varies across female and male respondents for fresh chicken meat.

6.3.2 The Effect of Age on the Trust-Confidence Link

A test for invariance of common paths is conducted across three age categories: 18-34 years, 35-54 years, and 55 years and over[15]. Comparison of the unconstrained (RMSEA=.039, CFI=.988) and constrained RMSEA=.037, CFI=.989) models for chicken yields a χ_2^2 difference value of .905, which is not statistically significant (p=.636). This indicates that the model is invariant across the three age groups. Furthermore, results from the path by path analysis suggest that the effects of both paths are equivalent across the three age categories. In fact, the estimated paths in the original model are .46 and .20 for the younger age group, .43 and .28 for the middle age group, and .46 and .20 for the older consumers, for each of the *Strust→Confid* and *Btrust→Confid*, respectively. As for salad, χ_1^2 difference between the original (RMSEA=.050, CFI=.990) and the restricted (RMSEA=.045, CFI=.991) models is equal to .088 which is not statistically significant (p=.767). Similar to chicken, age does not have a moderating effect on the trust-confidence interplay. Indeed, the freely estimated path *Strust→Confid* is equal to .58, .62 and .58 for the younger, middle and older age groups, respectively.

[15] representing 33 (38)%, 42 (40)% and 25 (22)% in the chicken (salad) sample.

6.3.3 The Effect of Education on the Trust-Confidence Link

A test of structural invariance is conducted to find out whether the paths are equivalent across participants with lower (i.e. elementary and secondary school) and higher levels of education (66% of the sample). For chicken, the relationship between brand trust and confidence is significant for the group with a post-secondary education (β_{stand}=.252, p=.003) but not for the group without a post-secondary education (β_{stand}=.183, p=.113). The difference in results indicates that education has a moderating effect on the brand trust-confidence link.

For the effect of trust in the food system on confidence, the finding shows the path coefficient *Strust→Confid* to be equivalent across the two groups, as reflected in χ_1^2 difference (value=.635) between the original and the constrained models that was not statistically significant (p=.635). Hence, it is deduced that the relationship between system trust and confidence operates in the same way for Canadian consumers regardless of their education level, which is not the case for the relationship between brand trust and confidence. For salad, a comparison between the baseline and the constrained-equal models yields χ_1^2 difference equal to 0.45 with p=.502. This insignificant result suggests an equivalent *Strust→Confid* path across the two groups. In other words, education has no moderating effect on the system trust-confidence link for packaged salad.

6.3.4 The Effect of Children on the Trust-Confidence Link

A test of structural invariance is conducted to check whether the presence of children in a household has a moderating effect on the casual relationships between trust and confidence. For chicken, the difference between the unrestricted (RMSEA=.051, CFI=.991) and the restricted (RMSEA=.046, CFI=.992) models yields a χ_2^2=1.029 with p=.598. The insignificant result indicates that the presence of children has no effect in moderating the link between trust and confidence. Similarly for salad, the comparison between the original (RMSEA=.030, CFI=.999) and the constrained (RMSEA=.020, CFI=.999) models yields a χ_1^2 difference value of .295 that was not statistically significant (p=.587). As such, the relationship between trust (*Strust* and *Btrust*) and confidence operates in the same way across respondents without and with children at home regardless of the food product.

6.3.5 The Effect of Income on the Trust-Confidence Link

The consistency of the model of Figure 6.11 is checked across four income categories: low income: ≤$49,999 (45% in the chicken sample), middle income: $50,000–$89,999 (35%), upper middle income: $90,000–$129,999 (11%), and high income: ≥$130,000 (9%). For chicken, the relationship between brand trust and confidence in credence attributes was significant only for the middle income group (β_{stand}=.354, p<.05). As such, the effect of income varies across income groups. For the effect of trust in the food system on consumer confidence, the result did not show evidence of variance at the .05 level of probability as reflected in χ_1^2 difference (value=.802) between the original and the constrained models that was not statistically significant (p=.370). Indeed, the freely estimated coefficients of the path *Strust→Confid* were .63, .59, .63 and .63 for the low, middle, upper middle and high income groups, respectively. Similarly for salad, the comparison between the original (RMSEA=.050, CFI=.982) and the constrained (RMSEA=.050, CFI=.981) models yields χ_1^2 difference value of 2.366 that was not statistically significant (p=.124). Hence, it is deduced that the relationships between trust in the food system and confidence operate in the same way across all income categories regardless of the product type.

6.3.6 The Effect of Risk Aversion on the Trust-Confidence Link

It was theorized that the effect of trust on confidence might vary across consumers having different levels of risk aversion (H12). The moderator was measured with respect to reluctance to try new food products or brands (*risk1*), and tendency to worry about food safety incidents (*risk3*). For chicken, the effects of *Strust* (β_{stand}=.477, p<.05) and *Btrust* (β_{stand}=.205, p=.009) on confidence are significant for consumers with lower levels of risk aversion (79% of the sample). Yet, these effects are not significant for consumer with higher levels of risk aversion (*Strust→Confid*: β_{stand}=.419, p=.068, *Btrust→Confid*: β_{stand}=.006, p=.975). In other words, paths are different across both groups. As expected, lower levels of risk aversion strengthen the linkage between trust and confidence in credence attributes.

For salad, the χ_1^2 difference between the original and the constrained models is equal to 1.681, and it is not statistically significant (p=.195). As such, risk aversion does not appear to moderate the link between system trust and confidence for fresh produce during the course of normal consumption. The difference in results between both products indicates the effect of trust

in the food system and in brands on consumer confidence in food attributes depends on the nature of the product category as well as on the levels of risk aversion. As such, not only does trust vary across product categories but it also depends on individual consumer characteristics.

6.3.7 The Effect of Past Experience on the Trust-Confidence Link

A test of invariance is conducted to check the consistency of the model of Figure 6.11 across groups with good and bad past consumption experiences. Consumers with bad experiences are those who switched away from a chicken or from a salad product in the past due to quality or safety issues. For chicken, the path *Btrust→Confid* was significant for consumers with good past consumption experience (β_{stand}=.233, p=.009) but not for those with a bad experience (β_{stand}=.146, p=.253). This divergence suggests that branding is an important quality cue that contributes to fostering confidence for consumers with a good experience but not for those with a bad experience. Comparison of both unconstrained and constrained models yields a χ_1^2 difference value of 2.999, which is not statistically significant at the 5% level (p-value=.083). As such, the relationship *Strust→Confid* is not significantly different across both groups at 95% confidence. The freely estimated paths are equal to .53 and to .77 for participants with good and bad experiences towards chicken, respectively. As such, while the impact of brand trust on confidence is moderated by past experiences (H13), the effect of trust in the food system on public confidence in credence attributes is the same for those with good and bad consumption experiences.

For salad, the χ_1^2 difference is equal to 1.81, and is not statistically significant (p-value=.179). Similar to chicken, the relationship between system trust and confidence in food attributes is equivalent across groups regardless of their past experience with fresh produce. That is, consumers tend to have similar levels of trust in the food system and similar levels of confidence, regardless of their past experiences. The difference in the importance of past experiences among product categories may be explained by the perceived vulnerability of the meat category, in part due to several meat related food safety incidents over the last few decades (Drescher et al., 2011). The divergence in results between chicken and salad suggests that the effects of trusting beliefs are contingent on food product categories and on personal experience.

6.3.8 The Effect of Ethical Behaviour on the Trust-Confidence Link

Ethical behaviour reflects actual purchase of products with attributes that engender ethically-motivated purchase decisions such as GM-free food. For chicken, the path *Btrust→Confid* turns out to be significant for people exhibiting higher levels of ethically-motivated behaviour but not for those showing lower levels of ethically-motivated behaviour (42% of the sample). This means that higher levels of ethical behaviour strengthen the link between brand trust and confidence in credence attributes (H14).

As for the effect of trust in the food system and confidence, comparison of both baseline (RMSEA=.067, CFI=.994) and restricted models (RMSEA=.056, CFI=.993) yields a χ_1^2 difference value of .011, which is not statistically significant (p=.916). This indicates that the equality constraints hold across groups: the relationship between trust in the food system (*Strust*) and confidence in food attributes (*Confid*) is invariant. In fact, the estimated path *Strust→Confid* is equal to .60 and .65 for people with higher and lower levels of ethically-motivated behaviour, respectively. As such, ethically motivated behaviour does not moderate the relationship between system trust and consumer confidence in credence attributes. Likewise for salad, the χ_1^2 difference of the baseline and the restricted models is equal to 1.989, and it is not statistically significant (p=.158). Similar to chicken, ethically-motivated behaviour does not appear to influence trusting beliefs toward fresh produce. The estimated path coefficient between *Strust* and *Confid* is equal to .59 and .63 for people with higher and lower levels of ethically-motivated behaviour.

Synthesis

The moderation effects of socio-demographic and psychographic variables are summarized in Table 6.9 below. Results indicate that moderators like gender, education and individual factors moderate the link between trust and confidence in credence attributes for chicken. On the other hand, none of the moderators examined turned out to have an effect for salad. As such, it is deduced that moderation effects on the trust-confidence interplay depend on the food product category.

For chicken, the effect of gender, education, risk aversion, past experiences and ethically-motivated show evidence of group differences only on the brand trust-confidence link. Age, household size and income were not significantly different between the groups. That is, consumer trust in food is important for most consumers, regardless of their age, household size or income. This is in line with the finding of Lobb, Mazzocchi and Traill (2006) who recognize that consumers (from UK, Italy, Germany, the Netherlands and France) of chicken significantly differ in terms of the sources they trust but found this to be unrelated to characteristics such as age, education or income. Therefore, the influence of trust on building consumer confidence in some food products (e.g. chicken) depends on a number of personal traits. As such, trust and confidence appear to evolve out of both personal factors and specific food product categories.

Table 6.9: Summary of the moderation effects

Moderators	***Chicken***		***Salad***
	Strust→Confid	***Btrust→Confid***	***Strust→Confid***
Gender	**Moderation effect**	**Moderation effect**	No moderation effect
Age	No moderation effect	No moderation effect	No moderation effect
Education	No moderation effect	**Moderation effect**	No moderation effect
Children in a household	No moderation effect	No moderation effect	No moderation effect
Income	No moderation effect	**Moderation effect**	No moderation effect
Risk aversion	**Moderation effect**	**Moderation effect**	No moderation effect
Past experience	No moderation effect	**Moderation effect**	No moderation effect
Ethically-motivated behaviour	No moderation effect	**Moderation effect**	No moderation effect

While existing studies from other countries conducted primarily in the context of a food scare or examining a specific issue such as organic food consumption or gene technology have found differences among consumers' attitudes and purchasing behaviour based on their demographics (e.g., Mazzocchi, Lobb and Traill, 2004b; Radman, 2005), the current results show that levels of trust and confidence vary among Canadian consumers with respect to their personal characteristics, even under the course of normal consumption. Furthermore, the moderation effects are found to be more salient on the brand trust-confidence link than on the system trust-confidence link, particularly for chicken. Perhaps, this suggests that institutional trust is more stable than trust in individual food brands and products of fresh chicken meat.

While the analysis focused on three personal factors, identification of other possible moderators (e.g., socially-networked lifestyles) in the context of food quality and food safety applied to different product categories deserves further research.

6.4 Conclusion

The analysis in this chapter finds evidence for a number of the postulated relationships, as smmarized in Table 6.10 below. Results related to system-based trust were compared and contrasted with the wide existing research on instituional trust from food and non-food contexts. With the gap in the literature on trust in food brands, in particular in the food economics area, the current findings related to brand trust contribute to the understanding of how food brands are perceived and how they contribute to overall public confidence in credence attributes. Nevertheless, these results are subject to further confirmation in future research applied to other food product categories.

Most of the hypothesised relationships on the effect of the dimensions of trust (in isolation) did not match *a priori* expectations. Instead, when combining measures of these dimensions into a single factor of system- and product-based trust (system integrity and brand performance), the results were highly significant. A possible interpretation is that consumers view various market actors (government, farmers, manufacturers and retailers) performing in a "system-like" mode to balance the weaknesses of each other (Ekici, 2004). Thus, the food system may develop trust-based relatonhsips with consumers when the actors encompassing that system are perceived competent, credible, benevolent, and reputable. In fact, consumers may expect every actor along the food chain to care and deliver their expectations with regards to high quality and safe food. This suggests that, in the context of this study, consumers perceive that the quality and safety of food is not guaranteed just at the farm level, or at just the industry level, but all along the supply system. This idea is supported in other studies such as by Ekici (2004) on consumer trust and mistrust in the American food system with regards to biotechnology. The author shows that when consumers see positive collaborations between food actors (e.g., between the government and manufacturers) they may have a greater confidence in the food system. That is, a perceived partnership between market actors leads to positive beliefs and attitudes towards the food chain as a whole. The synergy between the components of the food system is likely to reinforce consumer trust in higher quality and safer food.

The importance of these interactions has been manifested in the aggressive move toward models of closer vertical coordination of the value chain (e.g., Maple Leaf poultry value chain). In fact, retailers are increasingly cooperating with small and medium-size manufacturers to develop their food labels (Chen C.K, 2008). For instance, a successful brand (e.g., *Maple Leaf Prime*) must have a system in place to guarantee certain quality standards and to deliver products with the expected quality and safety attributes. Such a system can be established through combined public and private efforts that can verify (government, third parties) provenance (farm level) and process (industry level), and communicate information up through the supply chain on the products delivered (retail level).

Results from the postualted determinants of brand trust suggest that consumers do not trust food products in the same fashion. For instance, while reputation of the food system and brands appears to matter in building trust in the case of chicken, it is less relevant for salad. Furthermore, brand trust appears to play a stronger role in building consumer confidence in chicken than in packaged salad.

Another key finding is that trust in the food system exhibits a stronger impact on consumer confidence than trust in food brands. Perhaps, this implies that signalling mechanisms such as brands are useful for consumers to formulate confident expectations to judge the quality of a product. Yet, trust in brands alone may not be sufficient to bolster consumer confidence in credence attributes and may not work for every food category. In fact, through repeated purchases (loyalty), consumers acquire knowledge that facilitates independent evaluations of the product. Consequently, this likely reduces reliance on quality signals and enhances the role of trust expectations (Singh and Sirdeshmukh, 2000).

Second, and as a result, one can argue that consumers implicitly place more weight on trust in the food actors than trust in individual food products and brands. The relatively much stronger effect of system trust implies that decision-makers would benefit by investing in building trust relationships with consumers, for instance through transparent communication about the practices of the food system. In fact, making the public aware and well informed about the practices and intentions within the whole food system is a key element in maintaining public trust and, ultimately, consumer confidence. As such, both actions and communication could

establish consumer trust in the food actors and promote confidence in food safety and higher food quality. Finaly, the multigroup analysis demonstrates that socio-demographic variables are helpful to profile consumers for some food product categories such as chicken. For other products, such as bagged salad, individual traits do not appear to provide enough perspective on consumer trust and behaviour. As such, trust appears to be product- and individual-specific.

Table 6.10: Resutls of the hypotheses testing

Hypotheses	***Results***
H1: Trust in the food system will positively influence consumer confidence in credence attributes.	Supported for both products
H2: Brand trust will positively influence consumer confidence in credence attributes.	Supported for chicken Not supported for salad
H3: Trust in the food system will positively influence brand trust.	Supported for both products
H4: Perceived competence of the food system will positively influence trust in that system.	Not supported for either product
H5: Perceived credibility of the food system will positively influence trust in that system.	Not supported for either product
H6: Perceived benevolence of the food system will positively influence trust in that system.	Not supported for either product
H7: Perceived reputation of the food system will positively influence trust in that system.	Supported for chicken Not supported for salad
H8: Perceived competence of the brand will positively influence trust in that brand.	Not supported for either product
H9: Perceived credibility of the brand will positively influence trust in that brand.	Not supported for either product
H10: Perceived benevolence of the brand will positively influence trust in that brand.	Not supported for either product
H11: Perceived reputation of the brand will positively influence trust in that brand.	Supported for chicken Not supported for salad
H12: Low (high) levels of risk aversion will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.	Supported for chicken Not supported for salad
H13: Good (bad) consumers' past experiences will strengthen (weaken) the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes.	Partially supported for chicken Not supported for salad
H14: High levels of ethical involvement will strengthen the linkage between trust (whether in the food system or in a brand) and the level of confidence in credence attributes	Partially supported for chicken Not supported for salad
H15: Consumer confidence in credence attributes will positively influence (a) repurchase intentions and (b) brand loyalty.	Not supported for either product
H16: Trust in the food system will positively influence repurchase intentions	Supported for both products
H17: Brand trust will positively influence brand loyalty.	Supported for both products
H18: Repurchase intentions will positively influence brand loyalty.	Supported for chicken Not supported for salad

Chapter 7 – Conclusions and Implications

This chapter pinpoints the contribution of the thesis to the literature on consumer trust and branding of food products. The second section presents a summary of major research findings with respect to the impact of consumer trust in the food system, brand trust, the effect of attitudinal and demographic information on confidence in credence attributes, and ultimately on repurchase intentions and brand loyalty. Policy and research implications derived from these conclusions are explored in section 7.3. Lastly, limitations pertaining to the research methodology are discussed and avenues for future research are suggested.

7.1 Novelty and Contributions

The broad objective of the thesis is to investigate consumers' trust in the Canadian food system and in food brands with respect to credence attributes. The context of the analysis is during the course of normal consumption rather than in response to a food safety crisis, which could be useful in mapping baseline consumer perceptions about food quality and food safety. Given the credence nature of food quality and food safety attributes, consumers cannot verify with certainty whether the food they buy is high quality or is safe to eat, thus relying on abstract systems of regulation and quality signals such as brands help make informed choices. In fact, trust has been recognized as a rational strategy that reduces consumers' uncertainty in the context of decision-making, most notably involving the purchase of products with credence attributes (Dierks and Hanf, 2006).

Trust in food is a topical issue in an era of increasingly complex food systems. However, the nature and components of this trust, and how it affects consumers' perceptions of food, is a relatively new research area in food economics. Most studies on institutional and system trust have been carried out in sociology, marketing and political sciences, while a few studies to date in the context of food economics have investigated consumers' views on institutional trust, and reported the degree of consumer trust in different market actors (government, farmers, processors and food retailers). In this context, this thesis extends previous research on consumer trust in food by developing a framework on the joint role of trust in the food system and food brands in fostering consumer confidence, and ultimately, in the development of consumer commitment to

food brands. Drawing insights from the literature on trust, the thesis sets out to develop a model that simultaneously integrates system-oriented trust and product-oriented trust as precursors for consumer confidence in credence attributes. As such, it is one of the first studies to examine jointly the effects of trust in the food system and in food brands in a single application to consumer confidence in credence attributes.

Unlike extant studies that provided in-depth explanations of trust in one institution or more institutions (separately), this thesis takes a holistic approach to explain how consumers' trust in market actors within the food supply interact with each other and collectively contribute to beliefs about the trustworthiness of the complex food system in Canada. As a result, it allows a better understanding of consumers' perceptions of the Canadian food system.

In line with signalling theory, brands and their informational role in communicating credence attributes are modelled as quality cues that play a key role in helping consumers making informed consumption choices. The extant knowledge of brand trust in food economics is under-researched. This knowledge void inhibits a complete understanding of public perceptions of the food system with respect to food products and brands. One of the primary contributions of this thesis is to assist in addressing this gap in the literature within the food context by examining the effect of brand trust applied to two product categories: fresh chicken meat and packaged salad. While much of the existing marketing and business literature has focused on the direct relationship between brand trust and brand loyalty, the novelty here is to examine how consumer confidence influences the relationship between brand trust and brand loyalty.

The analysis shows that a Structural Equation Modelling approach enables the development of an empirical framework that links consumer perceptions of system- and product-based trust to consumer confidence. As such, the thesis investigates multi-level relationships (system/product/personal) not attended to by previous work in the food economics area. The SEM framework should help decision-makers comprehend how consumer trust is built and accordingly design strategies to maintain consumer confidence in meat and fresh produce.

The analysis shows that consumer trust is a complex phenomenon, and in the context of the data gathered for this thesis, is best explained when measured by a comprehensive single factor.

Another contribution of the thesis is to test the moderation effects of specific demographic and psychographic characteristics on the trust-confidence link. The economic literature deals with two main types of trust: institutional and calculative based both on past behaviour of others and experience (Rousseau et al., 1998; Williamson, 1993; North, 1990). The postulated model incorporates both types of trust and did not consider one to the detriment of the other. While system-based trust captures the institutional dimension of trust, the moderating effects of personal factors such as risk aversion and past consumption experience capture its calculative nature.

7.2 Summary of Major Research Findings

Based upon a comprehensive synthesis of the literature on trust, Chapter 2 concludes that trust in the food system and brand trust are potential mechanisms that determine consumer confidence in food quality and food safety. Perceived competence, credibility, benevolence and reputation are the predicted dimensions of public trust. Furthermore, the strength of the linkage between trust and confidence is anticipated to be contingent on consumer traits namely: risk aversion, past experience and ethical involvement. Chapter 3 builds upon these assumptions and formalizes the constructs of trust and confidence in a comprehensive Structural Equation Model. Chapter 4 describes the sample as a reasonable reflection of the Canadian population with respect to gender, age and geographic location, and slightly biased toward higher income and better educated respondents. Furthermore, the sample is dominated by individuals with lower levels of risk aversion, good consumption experiences and relatively higher levels of ethically-motivated behaviour toward food purchases. Chapter 5 and 6 present the empirical application of SEM of which the major results are summarized below.

Trust in the food system

Each of the perceived system competence, credibility, benevolence and reputation is posited to individually influence consumer trust in food actors. Yet, results show that system-based trust could be measured differently by taking into account the interactive effects of perceived competence, credibility, benevolence and reputation on public trust. Rather than a four-dimensional concept, trust in the food system is best explained with a one-factor model in the context of the literature-based model developed here, the measures used, and the selected

products. Hence, it is deduced that, in the context of this study, trust in the Canadian food system cannot be separated into independent dimensions of trust, but could be gauged by a single thorough dimension. Thus, the umbrella notion of system integrity proved to be a more robust concept in the context of this analysis. As such, trust in the context of food appears to be subtly distinct from trust in non-food contexts.

Findings also suggest that public trust in the food system is an important predictor for consumer confidence in credence attributes and this effect is more pronounced for packaged salad. Regardless of the product category, trust in the food system enhances the intent to repurchase. Yet, this latter contributes to the development of brand loyalty for chicken but not for salad. Thus, the characteristics of a food product category appear to influence brand-level effects such as brand loyalty.

Brand trust

Most of the existing marketing research studies have investigated brand trust primarily in non-food contexts as a bi- or tri-dimensional construct. The current findings show that Canadians tend to trust food brands when these products are perceived as high quality, are backed by credible information, have a good reputation and, at the same time, enhance consumers' welfare. This implies that food is different due to its distinct nature compared to industrial products or services.

Food products are perishable such that quality and availability may vary as a function of harvest conditions (seasonality). Furthermore, food products are bought on a frequent basis, while consumption of products that have been poorly handled or inappropriately stored might also present a health risk. As such, it appears that, in the context of this study, trust in food brands cannot be separated into independent components of trust, but could be measured by a global scale where different facets of competence, credibility, benevolence and reputation matter in trust building. Thus, the umbrella notion of brand performance proved to be a more robust concept in the context of this thesis.

Another key finding is that the effect of brand trust on consumer confidence varies across product categories. While trust in chicken brands appears to evolve to confidence in the quality and safety of these products, this is less significant for salad brands. While not directly explored in the survey, a number of differences between raw chicken and packaged salad greens may

explain the product-specific effects and could be explored in further research. These products differ substantially in terms of preparation and consumption contexts. For instance, consumers may be purchasing chicken as a main component of a meal, while salad is typically purchased as an accompaniment to a meal. It is possible that these different contexts influence how brand signals are perceived. Furthermore, bagged salad greens are usually precut and prewashed by the manufacturers or retailers, so they are ready-to-eat fresh and are consumed in their raw state. In contrast, consumers cook the raw chicken before consumption, which reduces the risk of foodborne pathogens (e.g., E. coli, Salmonella). Differences in the level of processing and the relative degrees of risk therefore also characterize these product categories.

The extent to which these differences affect underlying propensities to trust, and to trust brands, is an interesting question. Although it is not possible to determine from the survey data the extent to which survey respondents' perceptions of food safety risks differed across these product categories, this represents a potential area for future research in the context of trust. If indeed differing risk attitudes drive brand trust attitudes across product categories, it may be that communicating the product safety standards and sanitation processes in use in the sector is important to fostering public trust in fresh produce brands.

Consumer confidence in credence attributes

The predicted effects of system- and product-based trust on consumer confidence are fully supported for chicken but not for salad (only the effect of trust in the food system on confidence was significant). This suggests that what determines Canadians' confidence in credence attributes vary from one food category to another. Another key finding is that consumer confidence in credence attributes appear to rest more on trusting the food system as a whole than trusting individual food products. Doubtless, consumer trust in a food brand depends on the product itself in terms of safety, nutrition, quality, etc., but may also depend on who guarantees these attributes.

The role of psychographics and demographics

Because trust is based on past performance and previous consumption experiences, attitudinal patterns and demographic information may strengthen/weaken the extent to which

trust can evolve to confidence. These individual characteristics account for unobserved heterogeneity among consumers. Results indicate that personal factors matter for some products (e.g., raw meat) but not for others (e.g., fresh produce). As such, the moderation effects on the trust-confidence interplay appear to depend on the food product category. These effects were more salient for the meat category and more pertinent for the effect of brand trust on public confidence where gender, education, income, risk aversion, past experiences and ethically-motivated behaviour influence trust and confidence in food. Therefore, the analysis reveals that different segments of consumers appear to have different trusting attitudes and perceptions toward food brands.

7.3 Implications

The findings of this analysis may assist food system actors, including farmers, the food industry (food manufacturers and food retailers) and regulators in understanding the drivers for public trust in the food system and in food products in order to develop durable trust-based relationships with consumers.

7.3.1 Implications for the Food System

Public confidence in credence attributes is relevant in a food policy context as decision-makers seek to determine the appropriate balance of public intervention in the delivery of food safety and food quality assurances. Policy interventions often seek to address consumers' trust in the food system as a whole given the externality effects of a loss in trust for the collective reputation of the food sector. Government agencies empowered to monitor and enforce food safety legislation and food labelling regulations form part of the food system, and trust in these agencies is a very important component of public confidence. Indeed, "consumers are more likely to trust food chain actors, particularly regulators, if they perceive that these food chain actors share the same values and priorities with regard to consumer protection" (Cope et al, 2010: 356). While brand trust lies beyond the purview of state-level food policy, it is a contributory factor to consumer confidence in credence attributes. As such, the shared responsibility between public and private actors for food safety and food quality attests to the fact that trust in food is a complex phenomenon.

The current findings indicate that trust in the food system is more pronounced in building consumer confidence than trust in brands. That is, the respondents in this study appear to

implicitly place more weight on trusting the actors involved in the food system than trusting individual food products and brands. It seems that the effect of brand trust on consumer confidence in credence attributes is likely to be marginal compared to the effect of trust in the food system as a whole, which has the responsibility to assure food quality and food safety. Hence, while brands serve as quality signals, trusting them may become peripheral to overall consumer confidence in food, especially in the presence of strong or weak trust in the food system.

This implies that investing in trust relationships with consumers can be a key element in gaining/maintaining public trust and, ultimately, consumer confidence. One way to do so is by demonstrating to the public pro-active initiatives undertaken by food system actors to prevent problems (e.g., good manufacturing and handling practices, preventive food safety controls) and meet public expectations for food quality and food safety. Indeed, and while Canadians in general seem to be quite confident in the quality and safety of food products, a number of survey respondents expressed concerns on the free-form comments about what happens to food from farm to fork. The lack of awareness about food practices and safety initiatives suggests there may be a role for both the public and private sectors in promoting effective communication about the food system and its practices.

Partnership between food actors that offer harmonized and transparent messages concerning food practices and management activities are likely to improve consumer trust in credence attributes. Consumers would be more motivated to search for trustworthy brands when facing some degree of uncertainty. Finally, since trust varies among different groups of consumers, there is a need to understand how to communicate effectively with specified groups in the population who need the information the most (e.g., those most vulnerable to the risks).

7.3.2 Implications for Researchers

With the increase in branding of agricultural commodities, it is useful to examine consumer trust in branded food. Applying a SEM approach to the context of agri-food marketing advances knowledge on how consumers trust food with credence attributes, and ultimately how they make their food buying and consumption decisions. Furthermore, the current analysis involving a SEM approach provides the advantage of analyzing moderators and mediators of the effect of multiple factors on consumer confidence in credence attributes.

The absence of a commonly accepted evaluation approach to trust with the social sciences literature has led to different operationalization of the concepts of institutional trust and brand trust, predominantly in non-food contexts where the trust dimensionality diverges from one study to another and from one discipline to another. The current findings recommend a different treatment of trust in the context of food that consists of intertwined dimensions within a single thorough measurement scale. Taking into account different facets of trust including competence, credibility, benevolence and reputation, this thesis deepens our understanding of the notion of trust in the context of food. The development of a comprehensive scale for brand trust provides an alternative perspective on the measurement of trust. The one-factor models of system- (Figures 6.3 and 6.4) and product-based trust (Figures 6.5 and 6.6) provide a basis from which further research studies with different product categories and brands are needed to replicate and extend the current findings.

7.4 Limitations and Future Research

Practical limitations of this thesis are of note and provide scope for extensions to the research presented here. First, the few extant studies that looked at trust in food chain actors found that consumers perceive these actors to differ in the probability of sharing the truth in the case of a food scandal, for instance. That is, the importance and the effect of each dimension of trust may vary among actors, who may not behave in the same fashion (De Jonge et al, 2006). For instance, Peters, Covello and McCallum (1997: 18) found that "the determinant of trust and credibility are not monolithically invariant across organizations and institutions." In fact, the authors found that public perception of government commitment is the most important driver for trust and credibility, whereas public perception of industry concern and care is the most important dimension of trust (Peters, Covello and McCallum, 1997). These studies indicate that consumers place different levels of trust in actors within the food system and thus they are heterogeneous in the sense that they may perceive some actors more trustworthy than others. Since the current analysis deals with trust in the food system as one entity rather than separate food actors, it is not possible to determine which actor would be the most trusted in a standard purchasing situation.

Second, to generate a sufficient number of scale items to approximate comprehensive meanings of the constructs involved in the model, a thorough review of the social science and

business literatures is conducted. Yet, a few items were dropped from the original SEM due to their low scores, reflecting a weak relationship between the observed variable and the factor. This suggests they are likely to be measuring a different construct from the other items in the scale. Conducting early focus groups to confirm the set of measures would have provided a stronger basis for the postulated SEM. Furthermore, the high correlations between the antecedents of trust (competence, credibility, benevolence and reputation) suggest that the observed variables were measuring more than one factor. It is clear that trust is a complex phenomenon and although a number of established measures of trust exist in the literature, future research might assess the validity of the measures with respect to other food products (e.g., beef) and to other cultural contexts (e.g., USA, Europe). The model in this thesis provides a basis from which empirical analyses of the postulated determinants and consequences of consumer confidence in credence attributes can be applied to other food categories to determine whether trust not only differs across a food/non-food context but also whether differences exist across product categories or across brands within the same product category.

Third, the thesis looks at a broad spectrum of chicken and salad brands and does not distinguish between public perceptions of manufacturers' brands versus retailers' private label brands. As such, it remains unclear whether consumers buying national brands of food manufacturers perceive these brands differently than purchasers of retailers' private labels. Considering the recent trends showing higher levels of penetration and wider extension of national brands and in particular store brands, an avenue for future research might be to examine differences in consumer perceptions of national brands versus store brands, and for local versus imported food products and brands.

Fourth, the thesis provides a snapshot in time of Canadians' trusting perceptions by using cross-sectional data. This is believed an adequate approach for this analysis that explores the relationship between the system-based trust, brand trust and consumer confidence. Nevertheless, since trust is a dynamic process (e.g., Berg, 2004), a longitudinal approach could shed more light on how trust in the context of food evolves over time. In other words, it remains worthwhile to further understand in more depth the causality of the relationships over time through longitudinal field studies. This could include, for example, examining how external shocks (e.g., social and political events) alter the strength and direction of relationships between brand performance and

brand trust, or between brand trust and trust in the food system; or exploring how the relationships in the model would change if tested under specific situations of increased risk (e.g. during a major food safety incident).

Finally, one more extension is to expand the treatment of the food system by considering other important players. While the analysis focuses on four main actors directly involved in the food supply chain, trust in other key elements such as the scientific community, consumer groups, and the media is worthy of investigation. Indeed, consumers are expected to rely on brand images, labels, advertising and increasingly on social networks to form opinions and make informed consumption choices. Social media and social networks are gaining a progressively prominent role as a source of information and means of communication about food (e.g. twitter, Facebook, LinkedIn, YouTube, etc.). Furthermore, research has shown that consumers are more likely to trust people within their social circle. As such, understanding how these emergent popular online forums and social networks affect public trust in the context of food offers a rich area for further research.

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Appendix 1 – The Salad Survey

You are being invited to participate in a study related to your attitudes toward food.

Purpose and procedure: The research involves on online survey about consumer perceptions and attitudes when purchasing **salad greens**. The survey will take approximately 20 minutes to complete. Your participation in this study is appreciated and completely voluntary.

The unique ID and password included at the bottom of this message will allow you to log onto the survey. You are not required to answer any question that you do not want to answer. All responses to this questionnaire are anonymous, the results will be aggregated and the researchers will not be able to identify you in any way with your answers.

Potential Benefits: Your participation will help document the attitudes toward food products in Canada. Your answers will help provide insights to policy makers and the food industry.

Potential Risks: There are no known risks to participating in this survey.

Storage of Data: After the analysis is complete, all data will be securely stored by the research supervisor, Dr. Jill Hobbs, in the Department of Bioresource Policy, Business & Economics of University of Saskatchewan for a minimum of five years. If the researchers choose to destroy the data after the five years, it will be destroyed beyond recovery.

Confidentiality: Data will be combined and aggregated to protect individual responses. The researchers will not have access to your individual contact information.

The research conclusions will be published in a variety of formats, both print and electronic. These materials may be further used for purposes of conference presentations, or publication in academic journals, books or popular press. In these publications, the data will be reported in a manner that protects confidentiality and the anonymity of participants.

Right to Withdraw: Completion of the survey implies your consent to participate this research. You should feel free to decline to answer any particular question. You are free to withdraw from this survey at anytime using your respondent ID code until data have been pooled for analysis; the answers that you have provided prior to your withdrawal will be deleted. However, data withdrawal is no longer possible once data have been pooled for analysis and research dissemination has occurred.

You will be informed of any major changes that occur in the circumstances of this study or in the purpose and design of the research that may have a bearing on your decision to remain as a participant.

Questions: If you have any questions concerning the research project, please feel free to ask at any point; you are also free to contact the researchers at the numbers provided below if you have other questions:

Researchers: Rim Lassoued, PhD candidate, Department of Bioresource Policy, Business and Economics, University of Saskatchewan, Saskatoon, SK. Ph: 306-966-2041; Email: ril089@mail.usask.ca

Jill E. Hobbs, Professor, Department of Bioresource Policy, Business & Economics, University of Saskatchewan, Saskatoon, SK. Email: jill.hobbs@usask.ca

This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Ethics Office (306-966-2084).

Consent to Participate: I have read and understood the description provided above. Completion of this survey will constitute consent to participate and permission for the researcher to use the data gathered in the manner described. A copy of this consent form may be obtained by contacting the Researcher at the number listed above.

- ☐ **I Accept**
- ☐ **I Decline**

[Screener Question]

Do you purchase packaged salad greens?

- ❍ Yes (1)
- ❍ No (2)

Respondents answering "Yes" to the above question should proceed with the survey Those answering "No" should exit from the survey

Are you:

- ❍ Male (1)
- ❍ Female (2)

In what year were you born?

Please enter 4 digit year. ☐

In which province or territory do you live?

- ❍ Alberta
- ❍ British Columbia
- ❍ Manitoba
- ❍ New Brunswick
- ❍ Newfoundland & Labrador
- ❍ Northwest Territories
- ❍ Nova Scotia
- ❍ Nunavut
- ❍ Ontario
- ❍ Prince Edward Island
- ❍ Quebec
- ❍ Saskatchewan
- ❍ Yukon

1. Approximately how often do you buy your packaged salad for home consumption at the following types of stores?

	Twice a week	Once a week	Every two weeks	Once a month	Every few months	Once a year	Never	Prefer not to say
Supermarkets (such as Superstore, Extra Foods, Sobeys, IGA, Safeway, Metro, Loblaws, Maxi, Maxi &Cie, Dominion, Zehrs, SuperValu, No Frills, Save-On-Foods, etc.)	☐	☐	☐	☐	☐	☐	☐	☐

	Twice a week	Once a week	Every two weeks	Once a month	Every few months	Once a year	Never	Prefer not to say
Small grocery stores (neighbourhood)	☐	☐	☐	☐	☐	☐	☐	☐
Speciality food stores (such as ethnic stores)	☐	☐	☐	☐	☐	☐	☐	☐
Farmers' markets	☐	☐	☐	☐	☐	☐	☐	☐
Other, Please specify: _____	☐	☐	☐	☐	☐	☐	☐	☐

2a. We are interested in your general beliefs about the packaged salad you buy. Please indicate this on the scale provided.

	Not at all certain	Slightly uncertain	Somewhat certain	Very certain	Completely certain	Prefer not to say
In general, how certain are you about the overall quality of the packaged salad you buy?	☐	☐	☐	☐	☐	☐

2b. We are interested in your general beliefs about the packaged salad you buy. Please indicate this on the scale provided.

	Not at all optimistic	Slightly optimistic	Somewhat optimistic	Very optimistic	Completely optimistic	Prefer not to say
In general, how optimistic are you with the overall quality of the packaged salad you will be able to buy in the future?	☐	☐	☐	☐	☐	☐

2c. We are interested in your general beliefs about the packaged salad you buy. Please indicate this on the scale provided.

	Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Very knowledgeable	Completely knowledgeable	Prefer not to say
In general, how knowledgeable do you consider yourself about the overall quality of the packaged salad you buy?	☐	☐	☐	☐	☐	☐

3. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Government	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that government can be trusted to assure that packaged salad products are of high quality.	□	□	□	□	□	□
Generally, I can rely on government to assure that packaged salad products are of high quality.	□	□	□	□	□	□
I think that government generally has sufficient knowledge to guarantee high quality salad.	□	□	□	□	□	□
I think that government is doing regular inspection and monitoring to ensure that the production of packaged salad fulfills certain quality and safety standards.	□	□	□	□	□	□
I think that government generally has the expertise to control the quality of salad, for example, by effectively removing a contaminated product from the market.	□	□	□	□	□	□
I think that government generally provides transparent information about the quality of salad such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that government generally tells the truth about the safety of salad.	□	□	□	□	□	□
I think that government generally pays attention to consumers' demand for high quality salad.	□	□	□	□	□	□
I think that government views the health of consumers as being more important than the profits of producers.	□	□	□	□	□	□
I think that government generally encourages producers to adopt socially and environmentally responsible practices to improve the overall quality of salad.	□	□	□	□	□	□
Based on past behaviour, I think that government can be relied upon to act consistently in responding to food safety incidents related to salad.	□	□	□	□	□	□
In general, I hear positive comments about governmental efforts to improve the overall quality of salad.	□	□	□	□	□	□
In general, I have a positive view of the government.	□	□	□	□	□	□

4. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Food manufacturers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that food manufacturers can be trusted to provide high quality packaged salad products.	□	□	□	□	□	□
Generally, I can rely on food manufacturers to provide high quality packaged salad products.	□	□	□	□	□	□
I think that food manufacturers generally have sufficient knowledge to guarantee high quality salad	□	□	□	□	□	□
I think that food manufacturers generally have the expertise to control the quality of salad, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□

Food manufacturers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
I think that food manufacturers generally provide transparent information about the quality of salad such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that food manufacturers generally tell the truth about the safety of salad.	□	□	□	□	□	□
I think that food manufacturers generally pay attention to consumers' demand for high quality salad.	□	□	□	□	□	□
I think that food manufacturers view the health of consumers as being more important than their profits.	□	□	□	□	□	□
I think that food manufacturers generally tend to adopt socially and environmentally responsible practices to improve the overall quality of salad.	□	□	□	□	□	□
Based on past behaviour, I think that food manufacturers can be relied upon to act consistently in responding to food safety incidents related to salad.	□	□	□	□	□	□
In general, I hear positive comments about food manufacturers' efforts to improve the overall quality of salad.	□	□	□	□	□	□
In general, I have a positive view of food manufacturers.	□	□	□	□	□	□

5. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Food retailers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that food retailers can be trusted to provide high quality packaged salad products.	□	□	□	□	□	□
Generally, I can rely on the food retailers to provide high quality packaged salad products.	□	□	□	□	□	□
I think that food retailers generally have sufficient knowledge to guarantee high quality salad.	□	□	□	□	□	□
I think that food retailers generally have the expertise to control the quality of salad, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□
I think that food retailers generally provide transparent information about the quality of salad such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that food retailers generally tell the truth about the safety of salad.	□	□	□	□	□	□
I think that food retailers generally pay attention to consumers' demand for high quality salad.	□	□	□	□	□	□
Please select Disagree for this box	□	□	□	□	□	□
I think that food retailers view the health of consumers as being more important than their profits.	□	□	□	□	□	□

Food retailers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
I think that food retailers generally tend to adopt socially and environmentally responsible practices to improve the overall quality of salad.	□	□	□	□	□	□
Based on past behaviour, I think that food retailers can be relied upon to act consistently in responding to food safety incidents related to salad.	□	□	□	□	□	□
In general, I hear positive comments about food retailers' efforts to improve the overall quality of salad.	□	□	□	□	□	□
In general, I have a positive view of food retailers.	□	□	□	□	□	□

6. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Farmers ***(Individual farmers or farmers' associations)***	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that farmers can be trusted to provide high quality salad.	□	□	□	□	□	□
Generally, I can rely on farmers to provide high quality salad.	□	□	□	□	□	□
I think that farmers generally have sufficient knowledge to guarantee high quality salad.	□	□	□	□	□	□
I think that farmers generally have the expertise to control the quality of salad, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□
I think that farmers generally provide transparent information about the quality of salad such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that farmers generally tell the truth about the safety of salad.	□	□	□	□	□	□
I think that farmers generally pay attention to consumers' demand for high overall quality of salad.	□	□	□	□	□	□
I think that farmers view the health of consumers as being more important than their profits.	□	□	□	□	□	□
I think that farmers generally tend to adopt socially and environmentally responsible practices to improve the overall quality of salad.	□	□	□	□	□	□
Based on past behaviour, I think that farmers can be relied upon to act consistently in responding to food safety incidents related to salad.	□	□	□	□	□	□
In general, I hear positive comments about farmers' efforts to improve the overall quality of salad.	□	□	□	□	□	□
In general, I have a positive view of farmers.	□	□	□	□	□	□

Generic (non-branded) packaged salad means a salad sold without a brand name, with a label indicating, for example, the store name, weight, price and bar code, but does not have a brand logo or image.

7. Do you usually buy

❍ Generic, non-branded packaged salad
❍ A specific brand of packaged salad

We are still interested in your opinions about brands of packaged salad even if you have not bought them. (answer 9b)

8. Thinking about packaged salad brands, please check the BRAND that you purchase MOST OFTEN from the list below. The BRAND that you purchase most often is the one of interest, even if you purchase a different variety of salad within that brand range.

a) *President's Choice*	b) *President's Choice Organic*	c) *Sensations*	d) *Compliments*
			
☐	☐	☐	☐

e) *O Organic*	f) *Eating Right*	g) *Earthbound Farm Organic*	h) *Safeway*
			
☐	☐	☐	☐

i) *Ready Pac*	j) *Eat Smart*	k) *Fresh Express*	l) *Salad Express*	m) *Marketside*
				
☐	☐	☐	☐	☐

n) *Dole*	o) *River Ranch*	p) *Mann's*	q) *Fresh Attitude*	r) *Tanimura & Antle*
				
☐	☐	☐	☐	☐

e) Other brand Please specify ……	☐

9b. Thinking about the packaged salad brand that you selected above (the brand you purchase the most often), please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that the packaged salad brand I buy can be trusted for its high quality.	☐	☐	☐	☐	☐	☐
Generally, I think that the packaged salad brand I buy has reliable quality.	☐	☐	☐	☐	☐	☐
I believe that the packaged salad brand I buy is of high quality: with superior nutritional value, taste and appearance.	☐	☐	☐	☐	☐	☐
I believe that the packaged salad brand I buy is safe to eat.	☐	☐	☐	☐	☐	☐
I believe that the packaged salad brand I buy is better than generic salad in terms of overall quality.	☐	☐	☐	☐	☐	☐
I believe that the packaged salad brand I buy has transparent quality information on its package labelling such as accurate nutritional claims or quality claims (e.g., Fresh).	☐	☐	☐	☐	☐	☐
I believe that the label of the packaged salad brand I buy has accurate safety information.	☐	☐	☐	☐	☐	☐
I think the reason packaged salad brands are usually more expensive than generic salad is their higher quality.	☐	☐	☐	☐	☐	☐
I think that the packaged salad brand I buy enhances my well-being in terms of nutrition and health.	☐	☐	☐	☐	☐	☐
I think that the packaged salad brand I buy is produced in a socially and environmentally responsible manner.	☐	☐	☐	☐	☐	☐
I think that the packaged salad brand I buy has consistent overall quality.	☐	☐	☐	☐	☐	☐
In general, I hear positive comments about the salad brand I buy from my family and my friends.	☐	☐	☐	☐	☐	☐
In general, I have a positive view of food brands.	☐	☐	☐	☐	☐	☐

9a. Thinking about brands of packaged salad in general (if you do not buy branded salad), please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that packaged salad brands can be trusted for their high quality.	☐	☐	☐	☐	☐	☐
Generally, I think that packaged salad brands have reliable quality.	☐	☐	☐	☐	☐	☐
I believe that packaged salad brands, in general, are of high quality: with superior nutritional value, taste and appearance.	☐	☐	☐	☐	☐	☐
I believe that packaged salad brands in general, are safe to eat.	☐	☐	☐	☐	☐	☐
I believe those packaged salad brands are better than generic salad in terms of overall quality.	☐	☐	☐	☐	☐	☐
I believe that packaged salad brands, in general, are more likely to have transparent quality information on their package such as accurate nutritional claims or quality claims (e.g., Fresh).	☐	☐	☐	☐	☐	☐
I believe that labels on packaged salad brands are more likely to have accurate safety information.	☐	☐	☐	☐	☐	☐
I think the reason packaged salad brands are usually more expensive than generic salad is their higher quality.	☐	☐	☐	☐	☐	☐
I think that packaged salad brands are likely to enhance a consumer's well-being in terms of nutrition and health.	☐	☐	☐	☐	☐	☐
I think that packaged salad brands are produced in a socially and environmentally responsible manner.	☐	☐	☐	☐	☐	☐
I think that packaged salad brands have consistent overall quality.	☐	☐	☐	☐	☐	☐
In general, I hear positive comments about the packaged salad brands from my family and my friends.	☐	☐	☐	☐	☐	☐
In general, I have a positive view of food brands.	☐	☐	☐	☐	☐	☐

10. Please indicate your opinion on the statements below using the scale provided.

	Yes	No
In general, I am reluctant to try new food products or brands	☐	☐
I think that food products have an acceptable level of risk (that is little risk) and are unlikely to harm to my health.	☐	☐
When a food safety incident is in the news it makes me anxious about certain food product	☐	☐

11. We would like to know your own experiences with salad. Please indicate this on the scale provided below.

	Yes	No
In general, I am very happy with the salad product or brand I buy	☐	☐
In the last two years, I have switched away from a salad product or a brand because I was unhappy with the quality	☐	☐
In the last two years, I have switched away from a salad product or a brand because I thought it was not safe to eat.	☐	☐

11d. If you can remember, please tell us which product or brand you switched away from and the reason.

12. We would like to know your opinions on the following food issues.

	Yes	No
I feel strongly about animal welfare such as the feed given to animals and the conditions in which food animals are raised.	☐	☐
I feel strongly about the environment such as the use of chemicals in agriculture.	☐	☐
I am concerned about genetically modified food products.	☐	☐
I purchase animal friendly products whenever I can.	☐	☐
I purchase eco-friendly products whenever I can.	☐	☐
I avoid purchasing genetically modified food products whenever I can.	☐	☐
I have taken an active part in public or political actions in order to improve the food we buy (e.g., donated money to an animal welfare or environmental organization, contacted a politician on an ethical food issue, signed up for a petition, distributed leaflets, participated in a demonstration about food).	☐	☐

13. Thinking about your purchases of salad in the future, please tell us how likely it is that you will do the following:

	Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely	Prefer not to say
When doing my regular shopping over the next year I will check the prices of other available salad products or brands before buying the same product or brand.	☐	☐	☐	☐	☐	☐
Suppose the media reported the presence of salmonella in the salad product or brand you buy regularly. How likely are you to avoid purchasing that product or brand completely for some time after the story has left the news?	☐	☐	☐	☐	☐	☐

14. Thinking about your purchases of salad, please tell us how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
As long as I am satisfied, I will usually stick with purchasing the same salad brand or product each time I buy salad.	☐	☐	☐	☐	☐	☐
When the salad product or brand I usually buy is not available in my usual shopping store, I go and look for it in another store.	☐	☐	☐	☐	☐	☐
When another salad product or brand is having a sale, I generally buy it instead of my usual product or brand.	☐	☐	☐	☐	☐	☐

The following questions are designed to tell us a little about you. This information will only be used to report comparisons among groups of people. Your identity will not be linked to your responses in any way.

15. How many children younger than 18 live in your house?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3 or more

16. What is the highest level of education you have achieved?

- ❍ Elementary school
- ❍ Secondary (high) school
- ❍ Technical/College /University
- ❍ Graduate studies

17. For comparison purposes only, which one of the following best describes your annual household income level before taxes?

- ❍ Under $29,999
- ❍ $30,000 - $49,999
- ❍ $50,000 - $69,999
- ❍ $70,000 - $89,999
- ❍ $90,000 - $109,999
- ❍ $110,000 - $129,999
- ❍ $130,000 - $149,999
- ❍ More than $150,000

18. Please provide the first 3 digits of your home Postal code:

19. Is there anything else you would like to add?

Appendix 2 – The Chicken Survey

You are being invited to participate in a study related to your attitudes toward food.

Purpose and procedure: The research involves on online survey about consumer perceptions and attitudes when purchasing **fresh chicken meat**. The survey will take approximately 20 minutes to complete. Your participation in this study is appreciated and completely voluntary.

The unique ID and password included at the bottom of this message will allow you to log onto the survey. You are not required to answer any question that you do not want to answer. All responses to this questionnaire are anonymous, the results will be aggregated and the researchers will not be able to identify you in any way with your answers.

Potential Benefits: Your participation will help document the attitudes toward food products in Canada. Your answers will help provide insights to policy makers and the food industry.

Potential Risks: There are no known risks to participating in this survey.

Storage of Data: After the analysis is complete, all data will be securely stored by the research supervisor, Dr. Jill Hobbs, in the Department of Bioresource Policy, Business & Economics of University of Saskatchewan for a minimum of five years. If the researchers choose to destroy the data after the five years, it will be destroyed beyond recovery.

Confidentiality: Data will be combined and aggregated to protect individual responses. The researchers will not have access to your individual contact information.

The research conclusions will be published in a variety of formats, both print and electronic. These materials may be further used for purposes of conference presentations, or publication in academic journals, books or popular press. In these publications, the data will be reported in a manner that protects confidentiality and the anonymity of participants.

Right to Withdraw: Completion of the survey implies your consent to participate this research. You should feel free to decline to answer any particular question. You are free to withdraw from this survey at anytime using your respondent ID code until data have been pooled for analysis; the answers that you have provided prior to your withdrawal will be deleted. However, data withdrawal is no longer possible once data have been pooled for analysis and research dissemination has occurred.

You will be informed of any major changes that occur in the circumstances of this study or in the purpose and design of the research that may have a bearing on your decision to remain as a participant.

Questions: If you have any questions concerning the research project, please feel free to ask at any point; you are also free to contact the researchers at the numbers provided below if you have other questions:

Researchers: Rim Lassoued, PhD candidate, Department of Bioresource Policy, Business and Economics, University of Saskatchewan, Saskatoon, SK. Ph: 306-966-2041; Email: ril089@mail.usask.ca

Jill E. Hobbs, Professor, Department of Bioresource Policy, Business & Economics, University of Saskatchewan, Saskatoon, SK. Email: jill.hobbs@usask.ca

This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Ethics Office (306-966-2084).

Consent to Participate: I have read and understood the description provided above. Completion of this survey will constitute consent to participate and permission for the researcher to use the data gathered in the manner described. A copy of this consent form may be obtained by contacting the Researcher at the number listed above.

- ☐ **I Accept**
- ☐ **I Decline**

[Screener Question]

Do you purchase fresh chicken?

- ❍ Yes (1)
- ❍ No (2)

Respondents answering "Yes" to the above question should proceed with the survey Those answering "No" should exit from the survey

Are you:

- ❍ Male (1)
- ❍ Female (2)

In what year were you born?

Please enter 4 digit year. ☐

In which province or territory do you live?

- ❍ Alberta
- ❍ British Columbia
- ❍ Manitoba
- ❍ New Brunswick
- ❍ Newfoundland & Labrador
- ❍ Northwest Territories
- ❍ Nova Scotia
- ❍ Nunavut
- ❍ Ontario
- ❍ Prince Edward Island
- ❍ Quebec
- ❍ Saskatchewan
- ❍ Yukon

1. Approximately how often do you buy your chicken for home consumption at the following types of stores?

	Twice a week	Once a week	Every two weeks	Once a month	Every few months	Once a year	Never	Prefer not to say
Supermarkets (such as Superstore, Extra Foods, Sobeys, IGA, Safeway, Metro, Loblaws, Maxi, Maxi &Cie, Dominion, Zehrs, SuperValu, No Frills, Save-On-Foods, etc.)	☐	☐	☐	☐	☐	☐	☐	☐
Small grocery stores (neighbourhood)	☐	☐	☐	☐	☐	☐	☐	☐

	Twice a week	Once a week	Every two weeks	Once a month	Every few months	Once a year	Never	Prefer not to say
Speciality food stores (such as ethnic stores)	☐	☐	☐	☐	☐	☐	☐	☐
Farmers' markets	☐	☐	☐	☐	☐	☐	☐	☐
Other, Please specify: _____	☐	☐	☐	☐	☐	☐	☐	☐

2a. We are interested in your general beliefs about the chicken you buy. Please indicate this on the scale provided.

	Not at all certain	Slightly uncertain	Somewhat certain	Very certain	Completely certain	Prefer not to say
In general, how certain are you about the overall quality of the chicken you buy?	☐	☐	☐	☐	☐	☐

2b. We are interested in your general beliefs about the chicken you buy. Please indicate this on the scale provided.

	Not at all optimistic	Slightly optimistic	Somewhat optimistic	Very optimistic	Completely optimistic	Prefer not to say
In general, how optimistic are you with the overall quality of the chicken you will be able to buy in the future?	☐	☐	☐	☐	☐	☐

2c. We are interested in your general beliefs about the chicken you buy. Please indicate this on the scale provided.

	Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Very knowledgeable	Completely knowledgeable	Prefer not to say
In general, how knowledgeable do you consider yourself about the overall quality of the chicken you buy?	☐	☐	☐	☐	☐	☐

3. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Government	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that government can be trusted to assure that chicken products are of high quality.	☐	☐	☐	☐	☐	☐
Generally, I can rely on government to assure that chicken products are of high quality.	☐	☐	☐	☐	☐	☐

Government	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
I think that government generally has sufficient knowledge to guarantee high quality salad.	□	□	□	□	□	□
I think that government is doing regular inspection and monitoring to ensure that the production of chicken fulfills certain quality and safety standards.	□	□	□	□	□	□
I think that government generally has the expertise to control the quality of salad, for example, by effectively removing a contaminated product from the market.	□	□	□	□	□	□
I think that government generally provides transparent information about the quality of salad such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that government generally tells the truth about the safety of salad.	□	□	□	□	□	□
I think that government generally pays attention to consumers' demand for high quality salad.	□	□	□	□	□	□
I think that government views the health of consumers as being more important than the profits of producers.	□	□	□	□	□	□
I think that government generally encourages producers to adopt socially and environmentally responsible practices to improve the overall quality of salad.	□	□	□	□	□	□
Based on past behaviour, I think that government can be relied upon to act consistently in responding to food safety incidents related to salad.	□	□	□	□	□	□
In general, I hear positive comments about governmental efforts to improve the overall quality of salad.	□	□	□	□	□	□
In general, I have a positive view of the government.	□	□	□	□	□	□

4. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Food manufacturers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that food manufacturers can be trusted to provide high quality chicken products.	□	□	□	□	□	□
Generally, I can rely on food manufacturers to provide high quality chicken products.	□	□	□	□	□	□
I think that food manufacturers generally have sufficient knowledge to guarantee high quality salad	□	□	□	□	□	□
I think that food manufacturers generally have the expertise to control the quality of chicken, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□
I think that food manufacturers generally provide transparent information about the quality of chicken such	□	□	□	□	□	□

Food manufacturers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
as accurate information about the nutritional value.						
I think that food manufacturers generally tell the truth about the safety of chicken.	□	□	□	□	□	□
I think that food manufacturers generally pay attention to consumers' demand for high quality chicken.	□	□	□	□	□	□
I think that food manufacturers view the health of consumers as being more important than their profits.	□	□	□	□	□	□
I think that food manufacturers generally tend to adopt socially and environmentally responsible practices to improve the overall quality of chicken.	□	□	□	□	□	□
Based on past behaviour, I think that food manufacturers can be relied upon to act consistently in responding to food safety incidents related to chicken.	□	□	□	□	□	□
In general, I hear positive comments about food manufacturers' efforts to improve the overall quality of chicken.	□	□	□	□	□	□
In general, I have a positive view of food manufacturers.	□	□	□	□	□	□

5. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Food retailers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that food retailers can be trusted to provide high quality chicken products.	□	□	□	□	□	□
Generally, I can rely on the food retailers to provide high quality chicken products.	□	□	□	□	□	□
I think that food retailers generally have sufficient knowledge to guarantee high quality chicken.	□	□	□	□	□	□
I think that food retailers generally have the expertise to control the quality of chicken, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□
I think that food retailers generally provide transparent information about the quality of chicken such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that food retailers generally tell the truth about the safety of chicken.	□	□	□	□	□	□
I think that food retailers generally pay attention to consumers' demand for high quality chicken.	□	□	□	□	□	□
Please select Disagree for this box	□	□	□	□	□	□
I think that food retailers view the health of consumers as being more important than their profits.	□	□	□	□	□	□
I think that food retailers generally tend to adopt socially and environmentally responsible practices to improve the	□	□	□	□	□	□

Food retailers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
overall quality of chicken.						
Based on past behaviour, I think that food retailers can be relied upon to act consistently in responding to food safety incidents related to chicken.	□	□	□	□	□	□
In general, I hear positive comments about food retailers' efforts to improve the overall quality of chicken.	□	□	□	□	□	□
In general, I have a positive view of food retailers.	□	□	□	□	□	□

6. Below is a list of statements related to government, food manufacturers, food retailers, and farmers. For each, please indicate how much you agree or disagree using the scale provided. Note that the word "Government" refers to the general notion of public organizations (at the local, provincial and federal levels) such as a federal or provincial food, health or environmental ministry or agency, public certifying and grading organizations.

Farmers ***(Individual farmers or farmers' associations)***	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that farmers can be trusted to provide high quality chicken.	□	□	□	□	□	□
Generally, I can rely on farmers to provide high quality chicken.	□	□	□	□	□	□
I think that farmers generally have sufficient knowledge to guarantee high quality chicken.	□	□	□	□	□	□
I think that farmers generally have the expertise to control the quality of chicken, for example, by effectively removing a contaminated food product from the market.	□	□	□	□	□	□
I think that farmers generally provide transparent information about the quality of chicken such as accurate information about the nutritional value.	□	□	□	□	□	□
I think that farmers generally tell the truth about the safety of chicken.	□	□	□	□	□	□
I think that farmers generally pay attention to consumers' demand for high overall quality of chicken.	□	□	□	□	□	□
I think that farmers view the health of consumers as being more important than their profits.	□	□	□	□	□	□
I think that farmers generally tend to adopt socially and environmentally responsible practices to improve the overall quality of chicken.	□	□	□	□	□	□
Based on past behaviour, I think that farmers can be relied upon to act consistently in responding to food safety incidents related to chicken.	□	□	□	□	□	□
In general, I hear positive comments about farmers' efforts to improve the overall quality of chicken.	□	□	□	□	□	□
In general, I have a positive view of farmers.	□	□	□	□	□	□

Generic (non-branded) chicken means a chicken sold without a brand name, with a label indicating, for example, the store name, weight, price and bar code, but does not have a brand logo or image.

7. Do you usually buy

❍ Generic, non-branded chicken
❍ A specific brand of chicken

We are still interested in your opinions about brands of chicken even if you have not bought them. (answer 9b)

8. Thinking about chicken brands, please check the BRAND that you purchase MOST OFTEN from the list below. The BRAND that you purchase most often is the one of interest, even if you purchase a different variety of chicken within that brand range.

s) *President's Choice*  	t) *President's Choice Blue Menu*  	**u)** *Compliments* 	v) *Sensations by Compliments* 
☐	☐	☐	☐
w) *Irresistibles*  	x) *Safeway*  	y) *Eating right*  	z) *Maple Leaf Prime* 
☐	☐	☐	☐
h) Lilydale  	*i) Exceldor*  	*j) Granny's*  	*k) MapleLodge* 
☐	☐	☐	☐

f) Other brand Please specify ……	□

9b. Thinking about the chicken brand that you selected above (the brand you purchase the most often), please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that the chicken brand I buy can be trusted for its high quality.	□	□	□	□	□	□
Generally, I think that the chicken brand I buy has reliable quality.	□	□	□	□	□	□
I believe that the chicken brand I buy is of high quality: with superior nutritional value, taste and appearance.	□	□	□	□	□	□
I believe that the chicken brand I buy is safe to eat.	□	□	□	□	□	□
I believe that the chicken brand I buy is better than generic chicken in terms of overall quality.	□	□	□	□	□	□
I believe that the chicken brand I buy has transparent quality information on its package labelling such as accurate nutritional claims or quality claims (e.g., Fresh).	□	□	□	□	□	□
I believe that the label of the chicken brand I buy has accurate safety information.	□	□	□	□	□	□
I think the reason chicken brands are usually more expensive than generic chicken is their higher quality.	□	□	□	□	□	□
I think that the chicken brand I buy enhances my well-being in terms of nutrition and health.	□	□	□	□	□	□
I think that the chicken brand I buy is produced in a socially and environmentally responsible manner.	□	□	□	□	□	□
I think that the chicken brand I buy has consistent overall quality.	□	□	□	□	□	□
In general, I hear positive comments about the chicken brand I buy from my family and my friends.	□	□	□	□	□	□
In general, I have a positive view of food brands.	□	□	□	□	□	□

9a. Thinking about brands of chicken in general (if you do not buy branded chicken), please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
In general, I think that chicken brands can be trusted for their high quality.	□	□	□	□	□	□
Generally, I think that chicken brands have reliable quality.	□	□	□	□	□	□
I believe that chicken brands, in general, are of high quality: with superior nutritional value, taste and appearance.	□	□	□	□	□	□

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
I believe that chicken brands in general, are safe to eat.	☐	☐	☐	☐	☐	☐
I believe those chicken brands are better than generic chicken in terms of overall quality.	☐	☐	☐	☐	☐	☐
I believe that chicken brands, in general, are more likely to have transparent quality information on their package such as accurate nutritional claims or quality claims (e.g., Fresh).	☐	☐	☐	☐	☐	☐
I believe that labels on chicken brands are more likely to have accurate safety information.	☐	☐	☐	☐	☐	☐
I think the reason chicken brands are usually more expensive than generic chicken is their higher quality.	☐	☐	☐	☐	☐	☐
I think that chicken brands are likely to enhance a consumer's well-being in terms of nutrition and health.	☐	☐	☐	☐	☐	☐
I think that chicken brands are produced in a socially and environmentally responsible manner.	☐	☐	☐	☐	☐	☐
I think that chicken brands have consistent overall quality.	☐	☐	☐	☐	☐	☐
In general, I hear positive comments about the chicken brands from my family and my friends.	☐	☐	☐	☐	☐	☐
In general, I have a positive view of food brands.	☐	☐	☐	☐	☐	☐

10. Please indicate your opinion on the statements below using the scale provided.

	Yes	No
In general, I am reluctant to try new food products or brands	☐	☐
I think that food products have an acceptable level of risk (that is little risk) and are unlikely to harm to my health.	☐	☐
When a food safety incident is in the news it makes me anxious about certain food product	☐	☐

11. We would like to know your own experiences with chicken. Please indicate this on the scale provided below.

	Yes	No
In general, I am very happy with the chicken product or brand I buy	☐	☐
In the last two years, I have switched away from a chicken product or a brand because I was unhappy with the quality	☐	☐
In the last two years, I have switched away from a chicken product or a brand because I thought it was not safe to eat.	☐	☐

11d. If you can remember, please tell us which product or brand you switched away from and the reason.

12. We would like to know your opinions on the following food issues.

	Yes	No
I feel strongly about animal welfare such as the feed given to animals and the conditions in which food animals are raised.	☐	☐
I feel strongly about the environment such as the use of chemicals in agriculture.	☐	☐
I am concerned about genetically modified food products.	☐	☐
I purchase animal friendly products whenever I can.	☐	☐
I purchase eco-friendly products whenever I can.	☐	☐
I avoid purchasing genetically modified food products whenever I can.	☐	☐
I have taken an active part in public or political actions in order to improve the food we buy (e.g., donated money to an animal welfare or environmental organization, contacted a politician on an ethical food issue, signed up for a petition, distributed leaflets, participated in a demonstration about food).	☐	☐

13. Thinking about your purchases of chicken in the future, please tell us how likely it is that you will do the following:

	Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely	Prefer not to say
When doing my regular shopping over the next year I will check the prices of other available chicken products or brands before buying the same product or brand.	☐	☐	☐	☐	☐	☐
Suppose the media reported the presence of salmonella in the chicken product or brand you buy regularly. How likely are you to avoid purchasing that product or brand completely for some time after the story has left the news?	☐	☐	☐	☐	☐	☐

14. Thinking about your purchases of chicken, please tell us how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Prefer not to say
As long as I am satisfied, I will usually stick with purchasing the same chicken brand or product each time I buy chicken.	☐	☐	☐	☐	☐	☐
When the chicken product or brand I usually buy is not available in my usual shopping store, I go and look for it in another store.	☐	☐	☐	☐	☐	☐
When another chicken product or brand is having a sale, I generally buy it instead of my usual product or brand.	☐	☐	☐	☐	☐	☐

The following questions are designed to tell us a little about you. This information will only be used to report comparisons among groups of people. Your identity will not be linked to your responses in any way.

15. How many children younger than 18 live in your house?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3 or more

16. What is the highest level of education you have achieved?

- ❍ Elementary school
- ❍ Secondary (high) school
- ❍ Technical/College /University
- ❍ Graduate studies

17. For comparison purposes only, which one of the following best describes your annual household income level before taxes?

- ❍ Under $29,999
- ❍ $30,000 - $49,999
- ❍ $50,000 - $69,999
- ❍ $70,000 - $89,999
- ❍ $90,000 - $109,999
- ❍ $110,000 - $129,999
- ❍ $130,000 - $149,999
- ❍ More than $150,000

18. Please provide the first 3 digits of your home Postal code:

19. Is there anything else you would like to add?

Appendix 3 – Assessment of Normality and Outliers

Table 3.A: Assessment of Normality

	Chicken						*Salad*					
Variable	***min***	***max***	***skew***	***c.r.***	***kurtosis***	***c.r.***	***min***	***max***	***skew***	***c.r.***	***kurtosis***	***c.r.***
Scomp3	1	5	-0.677	-5.931	0.191	0.835	1	5	-0.583	-5.135	-0.079	-0.349
risk3	1	2	0.704	6.168	-1.505	-6.595	1	2	0.607	5.342	-1.632	-7.183
Bcred1	1	5	-0.602	-5.279	0.422	1.849	1	5	-0.538	-4.735	0.385	1.693
invol7	1	2	-0.876	-7.681	-1.232	-5.4	1	2	-0.89	-7.832	-1.208	-5.319
invol6	1	2	1.067	9.353	-0.861	-3.775	1	2	0.97	8.544	-1.058	-4.658
invol5	1	2	0.934	8.184	-1.128	-4.945	1	2	0.878	7.734	-1.228	-5.407
invol4	1	2	1.226	10.751	-0.496	-2.173	1	2	1.145	10.078	-0.689	-3.035
invol3	1	2	1.503	13.178	0.26	1.14	1	2	1.341	11.808	-0.201	-0.884
invol2	1	2	1.917	16.804	1.675	7.341	1	2	2.396	21.096	3.742	16.473
invol1	1	2	1.47	12.884	0.16	0.703	1	2	1.569	13.812	0.461	2.031
exp3	1	2	-2.116	-18.544	2.476	10.851	1	2	-2.77	-24.385	5.673	24.97
exp2	1	2	-1.872	-16.406	1.503	6.588	1	2	-1.641	-14.45	0.694	3.056
exp1	**1**	**2**	**4.243**	**37.194**	**16.005**	**70.144**	**1**	**2**	**4.265**	**37.542**	**16.186**	**71.246**
risk2	1	2	1.389	12.178	-0.07	-0.307	1	2	1.483	13.058	0.2	0.881
risk1	1	2	-1.093	-9.576	-0.806	-3.534	1	2	-1.171	-10.312	-0.628	-2.764
Scred1	4	20	-0.546	-4.789	0.455	1.993	4	20	-0.339	-2.986	0.805	3.543
Scred2	4	20	-0.528	-4.63	0.313	1.374	4	20	-0.439	-3.868	0.811	3.57
loyal1	1	5	-0.968	-8.486	1.378	6.038	1	5	-0.806	-7.094	0.975	4.291
confid3	1	5	0.027	0.239	-0.251	-1.099	1	5	-0.03	-0.262	-0.187	-0.824
confid1	1	5	-0.349	-3.063	-0.076	-0.332	1	5	-0.131	-1.157	-0.144	-0.635
confid2	1	5	-0.21	-1.839	-0.132	-0.577	1	5	0.005	0.045	-0.293	-1.289
loyal3	1	5	0.7	6.139	-0.04	-0.175	1	5	0.459	4.045	-0.289	-1.273
loyal2	1	5	0.299	2.62	-0.868	-3.803	1	5	0.426	3.752	-0.706	-3.107
purch2	1	5	1.063	9.321	0.463	2.029	1	5	1.348	11.868	1.2	5.284
purch1	1	5	-0.869	-7.613	0.273	1.195	1	5	-0.838	-7.381	0.268	1.179
Brepu1	1	5	-0.508	-4.453	0.517	2.268	1	5	-0.882	-7.764	1.468	6.463
Brepu2	1	5	-0.424	-3.713	0.536	2.348	1	5	-0.33	-2.905	0.318	1.4
Brepu3	1	5	-0.742	-6.507	1.201	5.265	1	5	-0.743	-6.544	1.198	5.272
Bbene1	1	5	-0.424	-3.716	0.04	0.176	1	5	-0.556	-4.892	0.442	1.945
Bbene2	1	5	-0.545	-4.778	0.219	0.959	1	5	-0.591	-5.205	0.75	3.301
Bcred2	1	5	-0.453	-3.967	0.068	0.297	1	5	-0.585	-5.148	0.665	2.928
Bcred3	1	5	-0.204	-1.789	-0.735	-3.222	1	5	-0.069	-0.603	-0.773	-3.404
Bcomp1	1	5	-0.433	-3.792	-0.073	-0.319	1	5	-0.524	-4.612	0.139	0.61
Bcomp2	1	5	-0.811	-7.111	1.579	6.922	1	5	-0.761	-6.699	1.458	6.419
Bcomp3	1	5	-0.117	-1.026	-0.548	-2.401	1	5	-0.171	-1.502	-0.389	-1.714

Btrust2	1	5	-0.819	-7.183	1.226	5.375	1	5	-0.865	-7.611	1.721	7.577
Btrust1	1	5	-0.816	-7.157	1.033	4.529	1	5	-0.584	-5.142	0.45	1.98
Srepu1	4	20	-0.64	-5.613	0.746	3.268	4	20	-0.614	-5.404	1.256	5.528
Srepu2	4	20	-0.405	-3.554	0.425	1.864	4	20	-0.128	-1.125	0.555	2.441
Srepu3	4	20	-0.446	-3.908	0.527	2.31	4	20	-0.537	-4.726	1.131	4.98
Sbene1	4	20	-0.749	-6.563	0.986	4.321	4	20	-0.463	-4.072	1.176	5.177
Sbene2	4	20	-0.338	-2.964	-0.129	-0.565	4	20	-0.242	-2.129	-0.059	-0.261
Sbene3	4	20	-0.452	-3.966	0.122	0.536	4	20	-0.382	-3.361	0.587	2.584
Scomp1	4	20	-0.694	-6.081	1.309	5.739	4	20	-0.508	-4.471	1.272	5.597
Scomp2	4	20	-0.765	-6.702	1.393	6.107	4	20	-0.525	-4.621	1.125	4.953
Strust2	4	20	-0.697	-6.108	0.689	3.022	4	20	-0.473	-4.163	1.093	4.813
Strust1	4	20	-0.603	-5.282	0.36	1.578	4	20	-0.544	-4.788	1.221	5.375
Multi-variate					**543.948**	**86.043**					**385.186**	**61.193**

Table 3.B: Observations farthest from the centroid (Mahalanobis distance)

Chicken				**Salad**			
Observation number	Mahalanobis d-squared	p1	p2	Observation number	Mahalanobis d-squared	p1	p2
118	172.009	0	0	343	145.461	0	0
1	170.557	0	0	462	130.401	0	0
6	150.802	0	0	5	108.172	0	0
15	147.932	0	0	382	106.792	0	0
411	140.627	0	0	284	105.891	0	0
241	140.015	0	0	270	105.69	0	0
69	126.68	0	0	106	104.884	0	0
29	124.418	0	0	396	100.839	0	0
22	122.032	0	0	221	100.468	0	0
99	118.622	0	0	410	100.204	0	0
129	117.897	0	0	4	98.736	0	0
370	117.612	0	0	149	97.645	0	0
302	110.991	0	0	360	96.76	0	0
243	110.023	0	0	340	96.552	0	0
261	109.095	0	0	369	95.889	0	0
274	107.33	0	0	174	93.671	0	0
141	103.46	0	0	335	93.183	0	0
443	101.119	0	0	114	92.225	0	0
373	100.02	0	0	202	90.434	0	0
314	99.381	0	0	104	88.772	0	0
353	98.706	0	0	268	88.709	0	0
395	95.95	0	0	86	86.926	0	0
165	93.657	0	0	275	84.497	0.001	0
167	92.24	0	0	337	84.474	0.001	0

218	90.418	0	0	54	84.215	0.001	0
5	90.018	0	0	110	83.823	0.001	0
35	89.428	0	0	67	83.78	0.001	0
318	88.727	0	0	392	83.501	0.001	0
426	88.011	0	0	255	83.487	0.001	0
266	87.091	0	0	370	82.863	0.001	0
45	86.352	0	0	388	82.524	0.001	0
448	85.623	0	0	355	81.267	0.001	0
304	84.526	0.001	0	193	81.216	0.001	0
230	83.705	0.001	0	228	81.178	0.001	0
342	82.467	0.001	0	24	80.769	0.002	0
134	80.789	0.002	0	22	80.264	0.002	0
236	80.78	0.002	0	205	79.254	0.002	0
160	80.612	0.002	0	159	78.719	0.003	0
327	80.213	0.002	0	452	78.346	0.003	0
180	79.698	0.002	0	151	78.291	0.003	0
272	78.842	0.002	0	278	78.1	0.003	0
358	78.317	0.003	0	227	78.055	0.003	0
387	78.165	0.003	0	386	77.405	0.003	0
120	77.618	0.003	0	156	77.238	0.004	0
42	76.924	0.004	0	83	77.095	0.004	0
72	75.784	0.005	0	288	76.77	0.004	0
195	75.288	0.005	0	45	76.393	0.004	0
279	75.004	0.006	0	172	76.373	0.004	0
369	74.682	0.006	0	287	76.325	0.004	0
383	74.641	0.006	0	189	76.152	0.005	0
34	74.535	0.006	0	82	75.852	0.005	0
377	74.356	0.007	0	253	75.661	0.005	0
332	74.007	0.007	0	364	75.559	0.005	0
328	73.799	0.008	0	272	74.617	0.006	0
356	73.402	0.008	0	224	74.216	0.007	0
186	73.249	0.008	0	173	73.864	0.007	0
206	72.921	0.009	0	101	73.82	0.007	0
404	72.865	0.009	0	158	73.107	0.009	0
59	72.828	0.009	0	435	72.896	0.009	0
253	72.773	0.009	0	383	72.839	0.009	0
140	72.724	0.009	0	377	72.225	0.01	0
367	72.441	0.01	0	9	71.979	0.011	0
237	72.353	0.01	0	414	71.748	0.012	0
438	71.14	0.013	0	316	71.339	0.013	0
283	70.456	0.015	0	16	70.899	0.014	0
8	70.377	0.015	0	119	70.756	0.014	0

88	69.212	0.019	0	311	70.692	0.014	0
372	69.132	0.019	0	177	70.668	0.014	0
350	68.831	0.021	0	210	70.464	0.015	0
336	68.693	0.021	0	89	70.349	0.015	0
333	68.647	0.021	0	143	70.283	0.016	0
23	68.441	0.022	0	195	70.075	0.016	0
203	68.374	0.022	0	217	69.985	0.016	0
214	67.725	0.025	0	387	69.725	0.017	0
91	67.676	0.026	0	200	69.34	0.019	0
419	67.325	0.027	0	325	68.789	0.021	0
66	67.313	0.028	0	289	68.577	0.022	0
55	67.24	0.028	0	429	68.367	0.023	0
161	66.72	0.031	0	42	68.139	0.024	0
79	66.587	0.031	0	408	67.838	0.025	0
343	66.293	0.033	0	240	67.587	0.026	0
260	66.034	0.035	0	332	66.646	0.031	0
294	65.966	0.035	0	90	66.059	0.035	0
391	65.79	0.036	0	330	65.997	0.035	0
208	65.401	0.039	0	257	65.962	0.035	0
460	65.256	0.04	0	305	65.567	0.038	0
153	64.983	0.042	0	163	65.498	0.038	0
7	63.621	0.053	0	137	65.266	0.04	0
216	63.466	0.055	0	130	65.252	0.04	0
189	63.304	0.056	0	198	64.798	0.043	0
74	63.258	0.057	0	426	64.241	0.048	0
393	62.88	0.061	0	66	63.932	0.051	0
166	62.47	0.065	0	116	63.906	0.051	0
375	62.459	0.065	0	59	63.747	0.052	0
366	62.431	0.065	0	277	63.481	0.055	0
420	61.958	0.071	0	204	63.328	0.056	0
247	61.865	0.072	0	155	63.3	0.056	0
242	61.684	0.074	0	389	63.216	0.057	0
306	61.682	0.074	0	358	62.908	0.06	0
339	61.636	0.074	0	131	62.721	0.062	0

Appendix 4 – Final Measurement Models

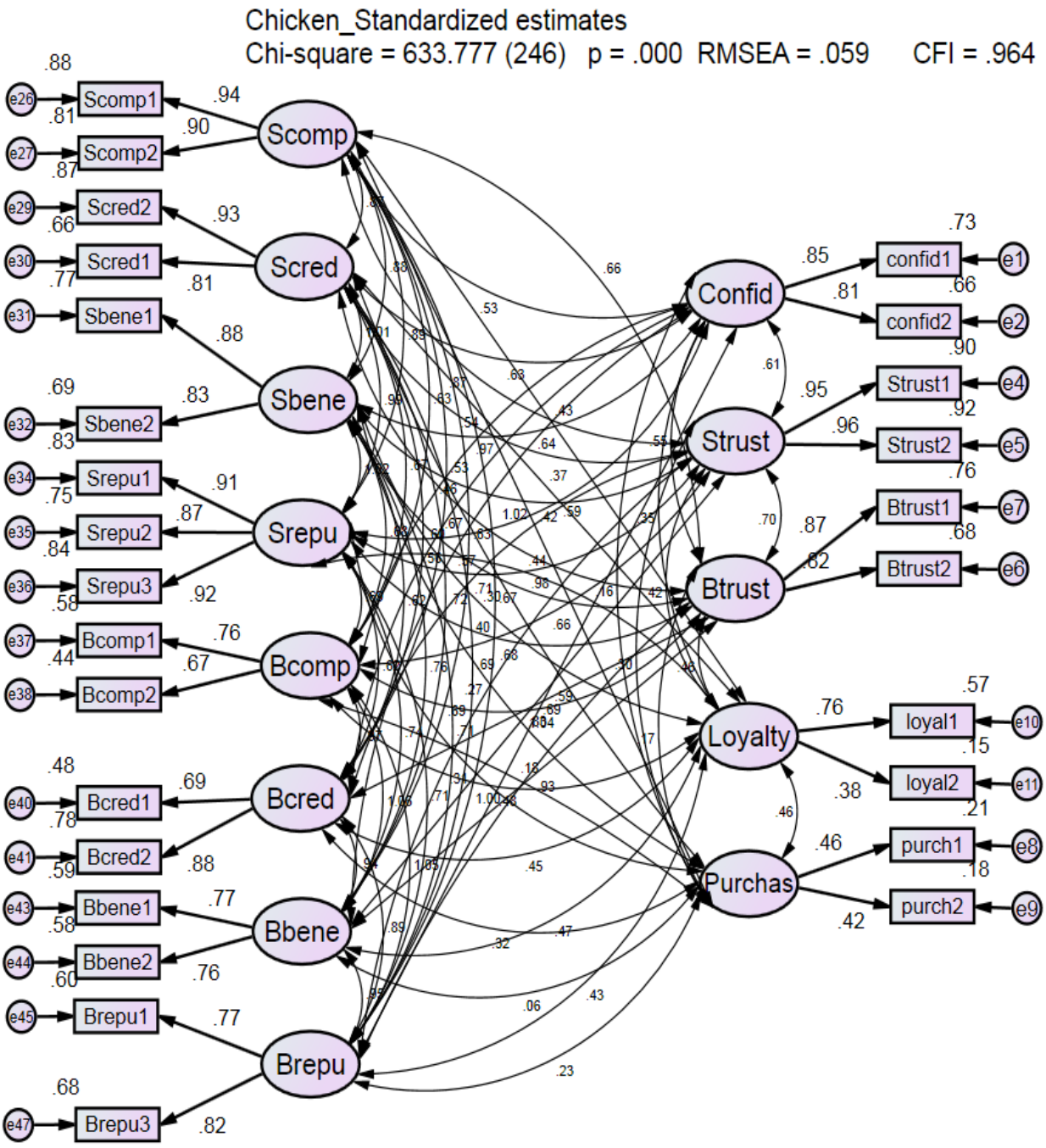

Figure Appendix 4a: Modified measurement model for fresh chicken

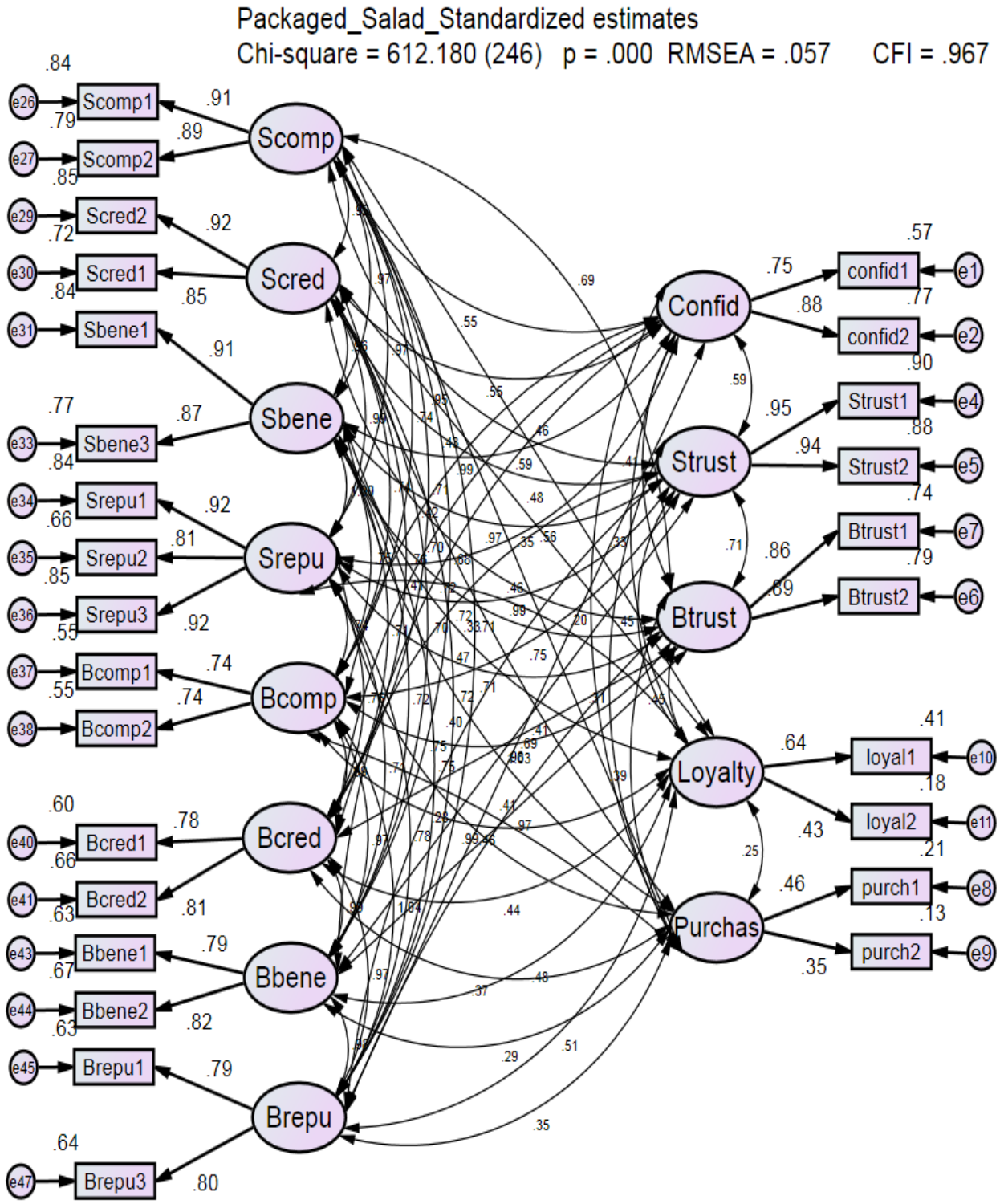

Figure Appendix 4b: Modified measurement model for packaged salad